CHNOLOGY DEPT

A PICTORIAL SURVEY OF CURRENT PRACTICE, EQUIPMENT AND MATERIALS

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Methods

First Copy

WEERAW-HILL PUBLISHING COMPANY. INC. . PRICE 20 CENTS

Navy's \$18,000,000 Air Station at Norfolk, Va.

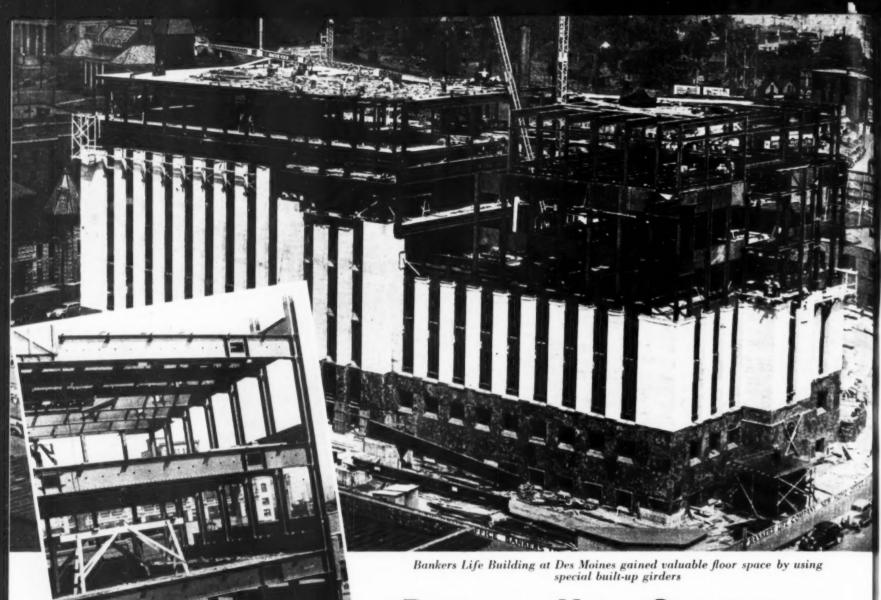
Army's \$20,000,000 Cantonment at Fort Devens

Electric Equipment for Building Big Earth Dam

Winter Concreting Technique on Bridge Construction

1941

MARCH



BUILT-UP GIRDERS AID LINE PRODUCTION

. . . and increase effective floor space in newest insurance building

WHEN the Bankers Life Company, Des Moines, Iowa, planned its new home, special attention was given to the efficient flow of people and paperwork.

These plate and angle girders, used instead of simple beams, saved steel tonnage

On the first five floors, girders 53 ft. long on 9 ft. 8 in. centers span the area without intermediate supports, for the 235-ft. length of the building. A substantial increase in effective floor space is developed by the use of these 53-ft. girders. Over 62,000 sq. ft. of unobstructed area is available for line production of insurance work.

These special girders were built up of Inland plates and

angles. They were designed with different cambers on the upper and lower chords. When the dead load was applied, the upper chord flattened out and the lower chord retained sufficient camber for optical effect.

In combination with the method of welding the flat tile arch support beams, these girders add great rigidity to the building, and save a large tonnage of steel.

Inland engineers are prepared, by long experience, to cooperate with fabricators in the problems which lead to economy of construction and the utility of steel structures.

SHEETS · STRIP · TIN PLATE · BARS · PLATES · FLOOR PLATES · STRUCTURALS · PILING · RAILS · TRACK ACCESSORIES · REINFORCING BARS TECHNOLOGY DEPT.

INLAND STEEL CO.

CURRENT JOBS

.... and Who's Doing Them

Public—At Childersburg, Ala., smokeless powder and bag-loading plant will be erected by E. I. Du Pont de Nemours & Co., of Wilmington, Del., for \$35,000,000. R. C. Mahon Co., of Detroit, Mich., will furnish and erect structural steel frame for \$20,000,000 1-story 760x1040-ft. aircraft engine plant for Stude-baker Corp. in South Bend, Ind. In Detroit, Mich., Navy Department awarded contract for Naval Ordnance plant to Hudson Motor Car Co., of Detroit, for \$16,000,000. War Department awarded contract for equipment, construction and operation of ammonia plant in Henderson, Ky., to Atmospheric Nitrogen Corp., of New York, at cost of \$15,484,195. J. T. Ryerson & Son, Inc., of Chicago, will build for Studebaker Corp. airplane engine parts plant in Chicago, Ill., at approximately \$12,000,000. Broderick & Gordon, of Colorado Springs, will construct small arms and ammunition plant in Denver, Colo., for War Department at cost of \$10,000,000. In Omaha, Neb., contract for construction of bomber assembly plant went to Peter Kiewit Sons Co., G. W. Condon Co., local contractors, and Woods Bros. Construction Co., of Lincoln, for \$8,078,000 on cost-plus-fixed-fee basis.

local contractors, and Woods Bros. Construction Co., of Lincoln, for \$8,078,000 on cost-plus-fixed-fee basis.

Contract to build ordnance depot at Umatilla, Ore., went to J. A. Terteling & Sons, of Boise, Idaho, for \$7,500,000. Construction of ammunition storage depot, including 300 igloo type underground structures in Ravenna, Ohio, is under way by Hunkin-Conkey Construction Co., of Cleveland, for \$4,000,000. Contract to furnish and erect structural steel frame 1-story building for Stude-baker Corp. aircraft engine gear plant at Fort Wayne, Ind., went to Mississippi Valley Structural Steel Co., of Melrose Park, Ill., with price of \$4,000,000. In Montreal, Quebec, Canada, Angus Robertson Ltd., of Montreal, will construct munition plant for \$4,000,000 plus equipment. Defense housing project in Hartford, Conn., consisting of 1,000 dwelling units, will be erected by Cauldwell-Wingate Co., of New York, at cost of \$3,597,000.

Industrial—In Monessen, Pa., contract for construction of coke ovens was awarded to Koppers Co., of Pittsburgh, for \$6,000,000. Stone & Webster Engineering Corp., of Boston, Mass., received contract for power plant addition at Hartford, Conn., at cost of \$4,000,000. Factory is under way in Cincinnati, Ohio, by Ferro Concrete Construction Co., local contractor, for \$2,000,000. Austin Co., of Cleveland, Ohio, will construct large chemical plant in Freeport, Tex., for \$2,100,000. Contract for masonry and excavation for Curtiss Wright Corp.., factory in Columbus, Ohio, was awarded to Darin Armstrong Co., of Detroit, Mich., with price of \$1,235,000.

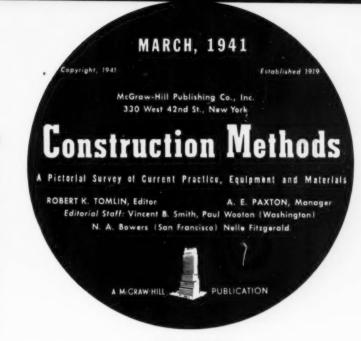
HEAVY CONSTRUCTION

At Trinidad and British Guiana, air base for Navy Department is under construction by James Stewart & Co., Peter F. Connolly Co., and H. J. Deutschbein Co., Inc., of New York, at estimated cost of \$11,487,000. At Argentia, Newfoundland, Navy Department awarded contract for air base to George A. Fuller & Co., and Merritt-Chapman & Scott. of New York, for \$9,425,000 on cost-plus-fixed-fee basis. In Baltimore, Md., 13 shipways and other shipbuilding facilities are under way by Bethlehem-Fairfield Shipyard. Inc., of Baltimore, for \$7,838,000. Air base is under construction at Trinidad, British West Indies, by George F. Driscoll Co., of Brooklyn, N. Y., and Walsh Construction Co., of Davenport, Ia., for \$5,190,000 on cost-plus-fixed-fee basis. In Wilmington, N. C., North Carolina Shipbuilding Co., of Wilmington, will build 6 shipways and other shipbuilding facilities for \$5,140,000. Shipways in New Orleans, La., are under construction by Louisiana Shipbuilding Co., Inc., of New Orleans, for \$4,841,000. Al Johnson Construction Co., of Minneapolis, Minn., Nick F. Helmers, Inc., of New York, McWilliams Dredging Co., of Chicago, Ill. and A. Guthrie & Co., Inc., of St. Paul, Minn., were awarded contract to construct air base at Newfoundland, for \$3,360,000 on cost-plus-fixed-fee basis.

Pacific Bridge Co., of San Francisco, will build drydock at San Diego, Calif., for \$2,800,000 on cost-plus-fixed-fee basis. In Bermuda, Arthur A. Johnson Corp., of Long Island City, N. Y., Necaro Co., Inc., of Brooklyn, N. Y., and Vermilya-Brown Co., Inc., of New York, will construct air base for \$2,456,000 on cost-plus-fixed-fee basis. Dominion Bridge Co. Ltd., of Lachine, Que., Canada, was awarded contract to build drydock in Halifax, N. S., for approximately \$2,500,000.

Superintendents of Construction Needed for Defense Work

U. S. Civil Service Commission, Washington, D. C., announces examination for superintendents with broad and responsible experience on large construction projects. Salaries for several grades range from \$3,200 to \$5,600 per year. For application forms and further information address U. S. Civil Service Commission, Washington, D. C., or Secretary, U. S. Civil Service Examiners at any first- or second-class post office. Applications will be rated as received until Dec. 31, 1941.



For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How GREASE TRUCK serviced heavy equipment on big dam job. —p. 39 How **WOOD BUILDINGS**, numbering more than a thousand, were

constructed at Army cantonment. —p. 42
CANVAS INCLOSURE of tractor cab protected operator in cold

How BATTERIES OF FLOODLIGHTS were mounted on wood tower How BATTERIES OF TRESTLE was built of prefabricated bents in

—p. 45

—p. 46

How SWIVEL-PIPE DISTRIBUTOR placed pumped concrete -p. 47 sewage treatment tanks.

How ELECTRIC EQUIPMENT was employed to operate equipment
for building dam.

—p. 48

for building dam. —p. 48

How GRAVEL PLANT fed by power shovel was made mobile by mounting on heavy crawler treads. —p. 49

How BULK CEMENT was unloaded from barge to bins by air-

activated conveyor.

FOREST ROADS are built and maintained with modern equip—p. 52

How STEPPED CUTS with vertical faces were made through loess bluffs in 15-ft. lifts with standard grading equipment. —p. 54

How BEND IN STEEL I-BEAM was made with hydraulic jack. —p. 55

How SAFETY NETS of manila rope protected workers on high steel

trestle.

WRINKLE BENDING with oxyacetylene torch put curves in

—p. 56 overland pipe line. —p. 56
CONCRETE PEDESTALS 6 ft. in diameter supported trestle concrete in dam.

How MUCK CARS were passed within narrow limits of rock tunnel How TRIAL HOUSES for defense workers were built at low cost with pre-assembled steel frames. —p. 57

How ARC-WELDING EQUIPMENT aided in tightening railway bridge I-bars with large turnbuckles. —p. 57

How NAVAL AIR STATION was built at rapid construction pace. —p. 58

WELL-POINTS drained sand soil prior to excavating sewer

TUBULAR FRAME HOIST raised brick and tile for barracks WINTER CONCRETING of highway bridges was done with aid

of tarpaulins and salamanders.

How PORTABLE STEEL GRATING served as temporary airfield

How CANVAS TENT foiled weather on building demolition and re-

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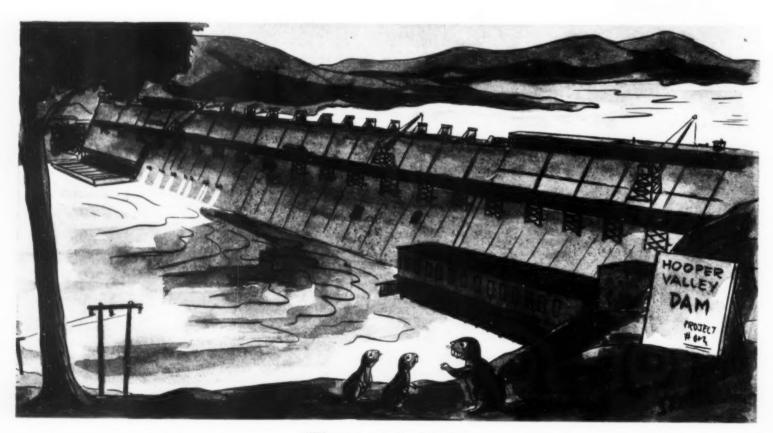
D. C. McGRAW Secretary

J. E. BLACEBURN Circulation Manage





"Listen, madam, are you looking for trouble with the union?"



"There—get the idea?"

PUTTING EXTRA YEARS OF WEAR IN

Heavy-Duty Floors



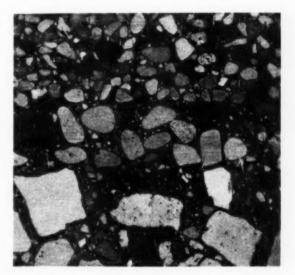
USE 'INCOR' 24-HOUR CEMENT FOR STRONGER, DENSER NON-DUSTING CONCRETE

INDUSTRIAL floors get hard use, so the concrete has to be good—and, above all, thoroughly cured. Use 'Incor' 24-Hour Cement; a minimum of mixing water; proportion, mix, place and finish carefully; then keep the concrete wet 24 to 48 hours, instead of the usual 8 to 10 days. 'Incor' has the call for heavy-duty work, because it cures thoroughly in the short time available on the job, producing a denser, longer-wearing floor. Concrete is ready to use sooner—no plant tie-ups.

'Incor' was used for about 100,000 sq. ft. of heavy-duty flooring in the new Lady Esther plant, Clearing, Ill., by Ce-Mas-Co Floor Co., Chicago, subcontractor for Warren B. Ewer Co., Chicago, general contractor... Albert Kahn, Inc., Detroit, architect. Good workmanship and 'Incor'* assure non-dusting floors that are strong, dense, longer wearing. Write for copy of "Heavy-Duty Floors." Lone Star Cement Corporation, Room 2264, 342 Madison Ave., New York.

*Reg. U. S. Pat. Off.

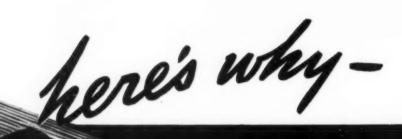




Above, new plant of Lady Esther, Ltd., Clearing, Ill.; Albert Kahn, Inc., Detroit, architect. About 100,000 sq. ft. of 'Incor' concrete heavy-duty floor (see photo, center) was used in this well - designed industrial structure... Properly proportioned 'Incor' floor topping (lower photo), carefully placed, shows uniform distribution of aggregate right up to the wearing surface. Good workmanship, good cement-result, a stronger, denser, longerwearing floor.

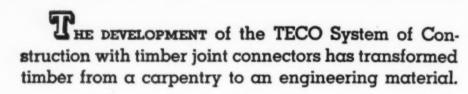
LONE STAR CEMENT CORPORATION
MAKERS OF LONE STAR CEMENT . . . 'INCOR' 24-HOUR CEMENT

The Teco Split Ring spreads the load on the timber joint over practically the entire cross section of the wood. In bolted joints this stress is localized around the bolt.



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CONSTRUCTION
MATERIAL IS
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ENGINEERING MATERIAL



Now, important information on the structural advantages and how to apply the connector technique is here for you in this



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The value of this publication is immediate to designers of new plant construction. This book will help you in designing lowest cost

new industry buildings required under the National Defense Program—and the new TECO CALCULATOR will help you to quickly determine the number of connectors required in a given joint—It's a new type of slide rule FREE to you upon request. Mail coupon now!

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GET OUT IN FRONT with EUCLIDS

WHETHER your contract is large

or small, whether it calls for improving a highway, building an airport, or increasing the capacity of an industrial plant you can do the jo. better, faster, and more economically with Euclids!

C. J. LANGENFELDER & SON, for example, select ed three 13-Yard Bottom-Dump EUCLIDS to haul 60,000 cu. yds. of sandy material for approaches to a bridge near Elkton, Maryland. On a comparatively short but tough haul, the great tractive power, mobility, and quick dumping of these big Euclids enabled them to do the job with the utmost speed and economy.

Contrast this with RALPH E. MILLS contract for enlarging Norfolk & Western's railroad yard at Roanoke, Virginia. On this job twelve of the same size Bottom-Dump EUCLIDS are hauling a million cu. yds. of excavation . . . 40,000 cu. yds. in one week over a mile haul. Yet it's the same Euclid qualities great capacity . . . speed on the haul road . . . flotation and power on the fill . . . quick dumping ... economy of operation ... and the stamina to keep going at a terrific pace which puts Euclids out in front on jobs like this!

Increase Your Contract Opportunities With Euclids! THE EUCLID ROAD MACHINERY CO. Cleveland, Ohio



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SELF - POWERED EARTH . ROCK . COAL . ORE

HAULING EQUIPMENT

CRAWLER WAGONS . ROTARY SCRAPERS . TAMPING ROLLERS





INTERNATIONAL Industrial WHEEL Tractors



• Here are International Harvester's latest products for the men who use industrial power—five brand-new International Industrial WHEEL Tractors. These "I" Tractors, added to the line of International TracTracTors and Power Units announced in 1940, make standardization on International Industrial Power more profitable than ever.

Three of these new "I" models have carburetor-type engines—two have International quick, easy-starting, full Diesel engines. They are streamlined, efficient, economical—ready to cut costs to the bone on a wide variety of jobs.

Contractors, counties and townships, cities and villages, airports, parks, cemeteries, golf courses, railroads, public utilities, factories, lumber and building supply yards, etc., will find these new Internationals useful, handy, and economical on a wide variety of construction, maintenance, materials-handling, and transportation work.

All these tractors have Toccohardened crankshafts, pressure lubrication, replaceable cylinders, five forward speeds up to 15 m.p.h., gear drive, countershaft brakes that can be individually controlled or interlocked, provision for mounting a variety of allied equipment, and many other features.

See these tractors at first hand. Watch them perform on the job. Ask the fearest International Industrial Power dealer or Companyowned branch for full information.

INTERNATIONAL HARVESTER COMPANY 180 North Michigan Avenue, Chicago, Illinois



The new International WHEEL Tractors are capable of operating a variety of equipment in their power range. This includes maintainers and graders; front-end shovels and loaders; cross-walk, side-walk, and other types of snow plows; road rollers; cranes and hoists; winches; brushes and sweepers; disk harrows and mixers for mixed-in-place roads; scrapers; dump wagons; trailers; tampers; mowers; etc.

"I" Tractor Facts at a Glance

1.4-4-4-cylinder valve-in-head gasoline engine. Bore and stroke 3\% x 41/4 inches. Five forward speeds up to 15 m.p.h. Develops 29.5 engine h.p. at 1,650 r.p.m.

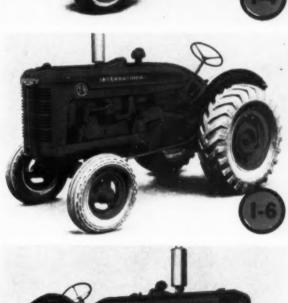
1-6 – 4-cylinder, valve-in-head gasoline engine. Bore and stroke 3 % x 5 ½ inches. Five forward speeds up to 14 m.p.h. Develops 40.5 engine h.p. at 1,450 r.p.m.

ID-6 DIESEL—Quick-starting, 4-cylinder, compression-ignition, 4-cycle Diesel engine. Bore and stroke 3% x 51/4 inches. Five forward speeds up to 14

m.p.h. Develops 38.5 engine h.p. at 1,450 r.p.m.

1-9-4-cylinder, valve-in-head gasoline engine. Bore and stroke 4.4 x 5.5 inches. Five forward speeds up to 15 m.p.h. Develops 54 engine h.p. at 1,500 r.p.m.

10-9 DIESEL—Quick-starting, 4-cylinder, compression-ignition, 4-cycle Diesel engine. Bore and stroke 4.4 x 5.5 inches. Five forward speeds up to 15 m.p.h. Develops 51.5 engine h.p. at 1,500 r.p.m.







Goodbye WATER PROBLEMS

HERE'S THE WORLD'S MOST COMPLETE LINE OF CONTRACTORS' PUMPS - DESIGNED TO HANDLE WATER AT LOWEST COST TO YOU!



MORE for Your Money! JAEGER, ALONE, GIVES YOU ALL THESE PUMPING FEATURES:

- UP TO 5 TIMES FASTER PRIMING with Jaeger "Priming Jet" — No adjustments, no need to "gun"
- POSITIVE RE-CIRCULATION CUT-OFF - controlled by flow, not
- FULL-RANGE IMPELLER for high efficiency under all conditions (all-steel in 4" to 8" sizes).
- LONG-LIFE SEAL—accessible for
- SELF-CLEANING SHELL nonclogging, accessible.
- THOUSANDS OF EXTRA HOURS OF SERVICE - result of higher
- INDIVIDUALLY TESTED for capacity and pressure before leaving factory.

And You Get All These Advantages in a Pump EXACTLY SUITED TO YOUR JOB!

Contractors use more Jaeger "Sure Primes" than any other pump in the world - because Jaeger gave them the modern self-priming centrifugal of small price and huge capacity - made it prime as much as 5 times faster, pump unfailingly, deliver far longer service — builds it in the only complete range of types, capacities and prices — and backs it with stocks and service within 2 hours of almost any place your job may be. Get our complete catalog and prices. The pump you want is there.

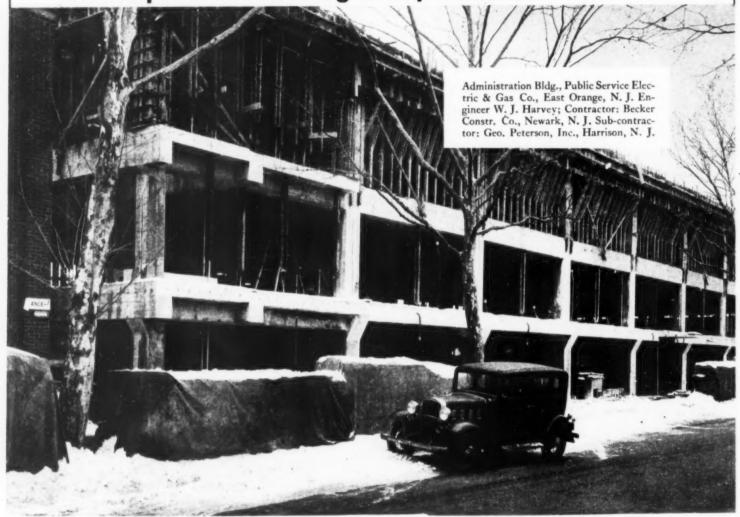
THE JAEGER MACHINE CO., 800 DUBLIN AVENUE, COLUMBUS, OHIO

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MIXERS 31/2 TO 56S — HOISTS 6 TO 100 H. P. — TOWERS 30 TO 500 FT. CONCRETE AND BITUMINOUS PAVING EQUIPMENT - TRUCK MIXERS

CASE #67

On the job with Atlas High-Early Cement...



7 DAYS' CONCRETING TIME SAVED ON EACH FLOOR

HERE'S a case, reports Geo. Peterson, Inc., subcontractor on concrete, where Atlas High-Early cement cut concreting time 13, and materially reduced form costs and protection and curing costs.

Here's his story: Instead of waiting 14 days to strip forms, necessary if standard portland cement had been used, column and beam forms were stripped on the fourth day after placing Atlas High-Early concrete. After re-shoring, the forms were re-erected on the next

floor on the fifth day. On the seventh day, plywood forms were removed from the floor slab, which measured 70' x 200' x 81/4" thick, and re-used on the next floor. Seven days per floor were saved, and only one set of forms instead of 13/4 sets of forms was necessary.

Average temperature during concrete construction was 28°; yet protection and curing time was cut from five days to two days by use of Atlas High-Early—a saving of three days per floor.

This is typical of the savings contractors are making everywhere with Atlas High-Early cement. Send for interesting folder, "Case Histories of Days and Dollars," which shows how Atlas High-Early cement can save time and money for you on many jobs. Universal Atlas Cement Co. (United States Steel Corp. Subsidiary), Chrysler Bldg. N. Y. C.

OFFICES: New York, Chicago, Philadelphia, Boston, Albany, Pittsburgh, Cleveland, Minneapolis, Duluth, St. Louis, Kansas City, Des Moines, Birmingham, Waco.

CM-H-28

ATLAS HIGH-EARLY CEMENT

Chother NORTHWEST ROCKSHOVEL 501 LISTand CLA makes bowless ORTHWEST ENGINEERING COMPANY 728 Steger Bldg. - 28 East Jackson Blvd. - Chicago, Illinois

BIG YARDAGES

with Low Equipment Cost...

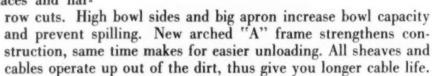


THE LP Carryall is built for earthmovers who want to move big yardages but don't want to invest in extra big tractors. It has a heaped capacity of 15 yards and is designed for use with the 80 H. P. "Caterpillar" D7 tractor. Very profitable for fleet operation with D7 pusher.

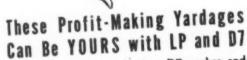
Easy Loading, Narrow Cutting Edge

The LP Carryall has an 8'6" cutting edge, enables you to apply greater drawbar pull per lineal foot of blade. D7 tractor weight

and Carryall's narrow overall width greatly facilitate shipping . . . narrow width makes for easier operation in tight places and nar-



See for yourself . . . on your own job . . . how a fleet of jobproved LP Carryalls and D7 tractors can give you big yardages with low equipment investment and low operating costs. Ask your LeTourneau-"Caterpillar" dealer for complete details NOW.



Loading on the level with a D7 pusher and hauling over favorable surfaces, you can expect the following results from LP Carryalls and D7 Tractors:

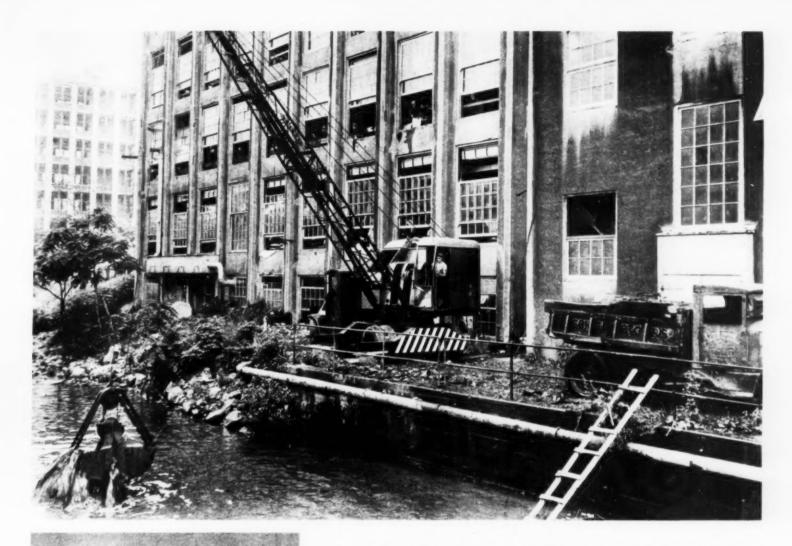
Haul-	Cycle	hour	Pay Yards
one way	Time		per 50-min.
(feet)	(min.)		hour
1000	6.5-7.7	7.7—6.5 9.5—8.2	

Variations shown in cycle time, trips per hour and yardage are result of the varying speeds available in D7 tractors. Under same conditions pay yards obtained without a pusher will run approximately 25% less.

FEORIA, ILLINOIS & STOCKTON, CALIFORNIA

CARRYALL* SCRAPERS, ANGLEDOZERS*, BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, DRAG SCRAPERS, CRANES, SHEEP'S FOOT ROLLERS, PUSHDOZERS, TOURNAPULLS*, TOURNATRAILERS*

Name Reg. U. S. Pat. Off.



GENERAL

Model 300 Clamshell outfit
owned by John Mucci of Yonowned by John Mucci of Yonowned by John Mucci of Yonowned by John Mucci of Yonkers, N. Y., working in mighty
close quarters. A reservoir is
close quarters. Corporational for the Consolidated Laundries Corporation.

A GENERAL GOES ANYWHERE

Even though the way is rough and narrow, a GENERAL gets there. Crawler, Truck, or Wheel Mounts give means of travel, and speeds suitable for every requirement.

It will pay you to inspect the GEN-ERAL'S staff before you buy. Drop a card today for new catalogs.

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Sizes: 1/2 to 21/2 Cu. Yd.
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IRONEROLLERS
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GENERAL

Sizes: 3/8-1/2-5/8-3/4 Cu. Yd. Diesel—Gas—Electric



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DRAGLINES - CRANES

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THE GENERAL EXCAVATOR COMPANY, Marion, Ohio

TRAXCAVATOR

EXCAVATES • LOADS GRADES · STRIPS BULLDOZES • LEVELS CLEARS LAND • PULLS CKFILLS . CASTS DIGS • REMOVES SNOW SPREADS . DITCHES





pavement—loading, cutting new grade single operation for a "TRAXCAVATOR"







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"TRAXCAVATORS" are powerful digging and loading machines which are blazing new trails in the modernization of excavating, dirt moving and material handling. They combine in one machine the usefulness of many, and will do more kinds of digging and material moving jobs than any other single piece of equipment. "TRAXCAVATORS" are highly mobile can travel around a job on their own power at speeds better than 5 miles per hour. Powered by "Caterpillar" track-type tractors and built in three sizes with bucket capacities from 1/2 to 21/2 cubic yards. Ask your "Caterpillar" dealer to show you why a "TRAXCAVATOR" is the Pioneer of Modern Methods. For illustrated catalog write Trackson Company, Milwaukee, Wis., U.S.A.



LOADING ROCK - On



TRAXCAVATORS ARE PROFIT-MAKERS

It's New! It's Free! PORTABLE CRUSHING PLANT GUIDE If you want to know "what's the latest" in portable crushing plants... if you want practical ideas on how to get bigger output and finer sizing from

TELSMITH Standard Portable Crushing, Screening and Loading Plants—

A single crusher in closed circuit with a bucket elevator and vibrating screen. The crusher may be a jaw or gyratory (for coarse or medium sizing), or a secondary crusher for fine reduction. The jaw crusher furnished is a high-speed Telsmith-Wheeling with cylindrical roller bearings. It turns out a uniform cubical product unusually free from slabs or dust. Recommended for production of $1''-1\frac{1}{2}''$ rock. In all cases, crusher is in closed circuit with the screen. No oversize can get into product.

TELSMITH Coarse Crushing Portables—Mounted jaw or gyratory crusher, not in closed circuit. A rugged, big capacity outfit for quantity production on big road jobs.

TELSMITH Tandem Crushing Plants—A super-crushing portable for quarry use. A tandem combination—coarse crushing unit ... followed by large capacity, fine crushing, screening-loading plant operating in closed circuit.

TELSMITH Dual Crushing and Screening Portable—Exceedingly mobile. Combines jaw breaker and roll crusher with more ample screening and conveying capacity.

• For complete details, get the new free 20-page Guide P-10.

Telsmith General Utility Portable Outfit, equipped with Telsmith-Wheeling Jaw Crusher and bucket elevator. Includes worm-wheel device for raising elevator.

a portable and which type plant will give it to you, whether you're crushing quarry rock, or preparing bank gravel

ask for free Guide P-10.



Ideal for the contractor or state or county highway department wanting a mounted crusher with a bucket elevator to deliver crushed product to bin or screen over bin. Furnished with either jaw or gyratory crusher, and with or without power unit. A low first cost, low upkeep outfit, but exceptionally well built.

SMITH ENGINEERING WORKS, 510 E. CAPITOL DRIVE, MILWAUKEE, WISCONSIN

TELSMITH

Cable Addresses: Sengworks, Milwaukee — Concrete, London

50 Church St. New York City

81 Binney St. Cambridge, Mass. 211 W. Wacker Drive Chicago, III. 713 Commercial Trust Bldg. Philadelphia, Pa.

Brandels M. & S. Co. Louisville, Ky. Roanoke Trac. & Eapt. Co. Roanoke, Va.

United Steel Sales, Toronto, Ont.

site and, relente, one

March 1941 - CONSTRUCTION METHODS - Page 17

HOW TO THE MARGIN OF



CASCADE, IOWA. A 477,000-yard heavy-clay highway project employing four "Caterpillar" Diesel D8 Tractors and one D7 Tractor with bulldozer, pushdozer, LaPlant-Choate Carrimor, and LeTourneau Carryall scrapers. Green Construction Co., contractor.



HE experience-wise contractor plans for a margin of error in every survey or estimate . . . and takes steps to protect himself from going "in the red."

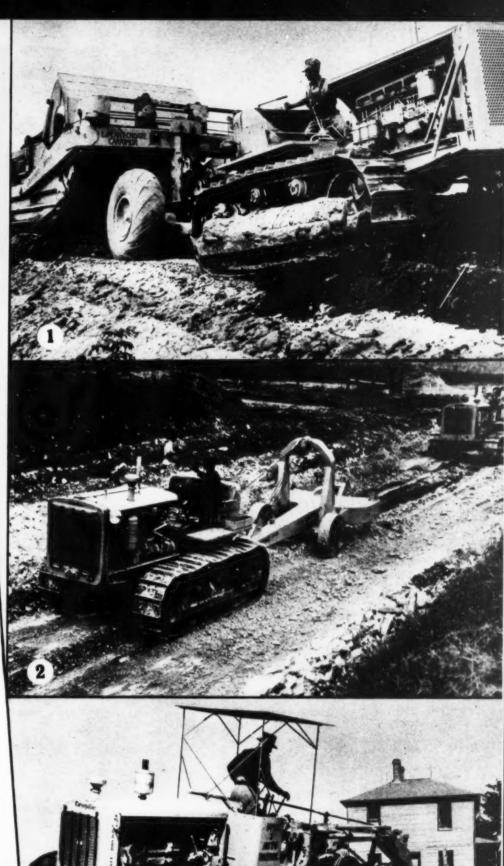
One of those steps, and it's one of the most important, is picking the right equipment. Choose it for its dependability — and for its reserve of power, ruggedness and work capacity.

That's when "Caterpillar" Diesel equipment gets an even more prominent part in the picture! Because here are tractors and motor graders you can count on for the extra punch you need when you run into hidden rock strata . . . unexpected, obstinate hard-pan . . . an unusual spell of bad weather . . . or any of a number of unforeseen risks that make the going heavier and threaten the chances for a good profit!

The steady grind of night-and-day shifts is overcome by "Caterpillar" quality con-struction — including "Hi-Electro" hardening for track roller-rims and shafts, track-pins, cylinder-liners, crankshaft and such parts that get the most punishing wear. Difficult ground-and-weather conditions, that would bog down ordinary equipment, are met by "Caterpillar's" stubborn, load-moving traction. On top of these, you've got a better-than-average Diesel economy - through the ability of "Caterpillar" Diesels to operate on the low-grade, low-priced, non-premium fuels!

CATERPILLAR TRACTOR CO., PEORIA, ILL.

- RELENTLESSLY AT IT 24 hours a day! One of the "Caterpillar" Diesel Tractor-scraper units on job mentioned on opposite page.
- TOUGH GOING. Ripping up rock with a "Caterpillar" Diesel D8 Tractor and LaPlant-Choate ripper. Near Sand Springs, lowa.
- FAST BANK DRESSING with a "Caterpillar" Diesel No.
 12 Motor Grader on road job mentioned on opposite page. Grader uses only about 2 gallons of fuel per hour.





CATERPILLAR DIESEL

TRACK-TYPE TRACTORS . ROAD MACHINERY . ENGINES AND ELECTRIC SETS

ARE YOU MAKING

a Donation

AGAIN THIS YEAR?

HOW much money are you going to sink into excess aggregate through loss of yield on poorly prepared subgrade this year? It costs you plenty if you make the slab too thick and in most states you pay if the slab's too thin - you're between the devil and the deep and you lose either way!

But Buckeye R-B Power Finegrader owners don't suffer these losses-and they use less labor and never hold up the paving crew because their Finegraders move out fast and cut the grade right on the payline! Smooth, accurate and true. No low or high spots that spell trouble and money!

Stop the "Donations" and make bigger profits this year on concrete or macadam jobs with a Buckeye R-B Power Finegrader. A size for every job, - 8' to 24'. WRITE FOR 8-PAGE BULLETIN NOW!

BUCKEYE TRACTION DITCHER COMPANY

Findlay, Ohio

READ What These STATE HIGHWAY **ENGINEERS** Have to Say!

probably range from five to ten percent, and this is largely attributable to extra slab thickness." - Engineer of Construction.

"... we do know that contractors have lost considerable in yield because of not having subgrade properly prepared. -Chief Engineer.

"Overruns vary from an average of 11/2% to as high as 8%. Where overruns occur they are generally the result of low subgrade and excessive thickness of pavement." -Engineer of Materials and

"Smoothness and trueness of subgrade are necessary, desirable and required, . . . the method chosen is that which works out to the best advantage of the party contracting to do this work."—Construction Engineer.

Buckeye















THAT'S HOW a hippo's mouth operates . . . and that's how the valves in your air compressors should operate.

In the service of contractors where dependable operation is essential, thousands of compressors are delivering full pressure at minimum cost... and valves keep CLEAN months on end with Texaco Alcaid, Algol or Ursa Oils.

These highly stable lubricants resist gumming, sludging and the formation of carbon deposits, assuring more efficient valve action and longer service between inspections. The outstanding performance that has made Texaco preferred in the contracting field has also made it preferred in the fields listed in the panel.

Buyers in these fields are enjoying many benefits. You, too, will find important advantages when you use Texaco Lubricants and Fuels.

A Texaco Lubrication Engineer will gladly cooperate in securing more dependable operation of your equipment. Phone the nearest of more than 2300 Texaco distributing plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

THEY PREFER TEXACO

- More railroad rolling equipment in the

 U. S. is lubricated with Texaco than with
 any other brand.
- More tourists use Texaco Fire-Chief Gasoline than any other brand.
- More scheduled airline mileage within the

 U. S. and to other countries is flown with
 Texaco than with any other brand.
- More buses, more bus lines and more

 bus-miles are lubricated with Texaco than
 with any other brand.
- More copper is produced in the U. S. by mines using Texaco Products than by all other copper mines combined.
- More stationary Diesel horsepower in the

 U. S. is lubricated with Texaco than with
 any other brand.
- More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

TEXACO DEALERS INVITE YOU TO ENJOY



METROPOLITAN OPERA every Saturday afternoon, NBC. See local newspaper for time and station.



TEXACO LUDIFICOIMIS
FOR ALL COMPRESSORS AND AIR TOOLS

ACE of All Trades . . . the CHEVROLET TRUCK



Inspect these NEW 1941 FEATURES

* TWO NEW VALVE-IN-HEAD STANDARD: 174
FOOT-POUNDS OF TORQUE—
90 HORSEPOWER "LOADMASTER": 192 FOOT-POUNDS OF TORQUE—93 HORSEPOWER* *
NEW RECIRCULATING BALL-BEARING STEERING GEAR * NEW, MORE COMFORTABLE DRIVER'S COMPARTMENT.

*Optional on Heavy Duty models at extra cost

60 MODELS

ON NINE LONGER WHEELBASES . . . A COMPLETE LINE FOR ALL LINES OF BUSINESS

For every trade or industry or business that uses motor trucks, ranging from fleet delivery units up to Heavy Duty models of 14,000 pounds gross-weight rating, there is a 1941 Chevrolet truck designed to fulfill your requirements.

For 1941, Chevrolet—the world's leading builder of motor trucks—presents the most complete and most capable line of trucks in Chevrolet's history. Now, from Chevrolet's expanded line, you may have your choice of sixty models on nine longer wheelbases. Now you may enjoy the benefits of Chevrolet's famous economy and long life in new models that incorporate important improvements in chassis and body, and the most powerful truck engines in the low-price field—the 90-horsepower Standard engine with 174 foot-pounds torque, and the 93-horsepower "Load-Master" engine with 192 foot-pounds torque, optional at small extra cost on Heavy Duty models.

CHEVROLET MOTOR DIVISION, General Motors Sales Corporation DETROIT, MICHIGAN

OUT-PULL · · · OUT-VALUE · · · OUT-SELL

LAPLANT-CHOATE
Forced Ejection Type
CARRIMOR SCRAPERS

Save you TIME and MONEY!





OF SAND, SHALE, CLAY, MUD AND LOAM

MARSCH, PETERSON, WALKER & CONDON are moving that amount of earth on the Kanopolis Dam site and they are moving it with LaPLANT-CHOATE "CARRIMOR" scrapers.

Why? — Because they are easier loading . . . will dump their load in high gear under conditions where other scrapers must dump in low . . . are easier on cable wear . . . will make more trips per day, and have many other advantages.

Here's what Ray Terry, superintendent of the job, says about LaPLANT-CHOATE"CARRIMOR"scrapers...

"They are the best for handling mud of any scrapers I have ever seen. You don't need to worry if you have muck in 'em, you can always unload 'em!"

Yes! There is a difference in forced-ejection scrapers, and LaPLANT-CHOATE "CARRIMOR" scrapers have many advantages.

Demand the best and buy the best.

TRY ONE ON YOUR JOB!

LAPLANT-CHOATE
Forced Ejection Type
CARRIMOR SCRAPERS

HERE'S WHY You finish "in the Money"

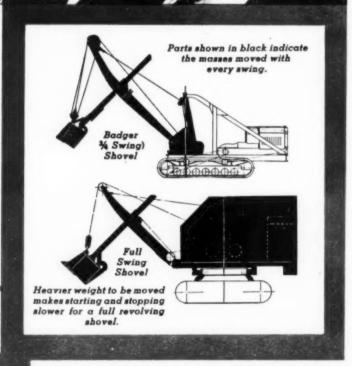
WITH A BADGER 1/2 YARD SHOVEL

• Any good operator can put more dirt where you want it, with a Badger than with any other shovel of its size and price.

You can readily see why this is so, for the Badger has no machinery deck to swing, and therefore starts, swings and stops faster—and it's more swings per hour that puts more dirt in the trucks for more money on any contract.

The Badger is easy to haul at truck speeds on its own wheel mounts, and when you get it to the job you've got a real dirt mover.

Ask for engineering specifications, low first cost . . . and PROOF that you can get more done quicker, and at less cost, with a BADGER. THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois.



MOTOR GRADERS
LOADERS
BLADE GRADERS
ELEVATING GRADERS
HYDRAULIC SCRAPERS
CRUSHING AND
SCREENING PLANTS

CABLE SCRAPERS
ROLL-RS
ROLL-A-PLANES
MOTOR SWEEPERS
BITUMINOUS
DISTRIBUTORS
SHOVELS AND CRANES

AUSTIN-WESTERN





Again, History Repeats Itself

When hydraulic brakes were introduced as a forward step in automobile construction, they were called impractical, unsafe—undependable. Controversy raged. But trial in service—on every type of car, under every conceivable driving condition or car, under every conceivable univing condition are proved their worth. Today, hydraulic brakes are standard equipment and taken for granted by the

Years ago, Atlas began experiments with the use of hexanitromannite in blasting caps—a chemical less sensitive to impact and friction. As a result, three motoring public. years ago came the commercial introduction of Atlas Manasite detonators with an increased margin of safety. Followed the inevitable question—are they dependable? History gives the answer: over 100,000,000 Atlas Manasite detonators already have been used... over 134 million on the Delaware Aqueduct alone!

Your Atlas representative will be glad to give you full details.

EXPLOSIVES

"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington, Del. · Offices in principal cities · Cable Address-Atpowco



TWE 20 POINTS GIVE YOU A TRUE PICTURE OF A ROCK SHOVEL

TURNTABLE

- 1. Double Center Drive pinion which—2. Applies power directly—fully concentrated on any one operation—3. Or spreads power for high-speed simultaneous operations.
- Two-piece swing drums designed to take the punishment of the hardest worked part of the shovel.
- Crowd clutch, extra wide to deliver full digging power, mounted on roller bearings; two-piece, easily reversed bands.

CRAWLER

- 1. Center "Chain" Drive
- 2. Two speeds either direction.
- 3. Steers either direction.
- 4. Travel and safety lock.

- 5. Mechanism runs in oil bath
- 6. Generous underneath clear-
- 7. Centralized lubrication.
- 8. Wider treads.

SHOVEL BOOM

- All-welded (strength, allsteel, torsion-resisting).
- 2. All-steel dipper stick.
- 3. Door stop to protect stick.
- 4. Automatic power dipper trip.
- Automatic crowd brake to hold stick extended.

CRANES, CLAMS, DRAGS

- Simultaneous hoist, swing and travel (or boom derricking).
- High-speed boom hoist power and precision control of boom derricking and lowering.

• A true rock shovel just doesn't dig rock but digs it at rock bottom costs. Here are 20 points covering the 1¾ yd. Lorain-80 rock shovel. Examine them carefully because each contributes its proportionate share to the finished picture, which is—a hard-boiled shovel possessing the power and strength to take rock digging out of the red permanently.

The Lorain-80's record in rock is yours for the asking. Write today for complete design and performance data.

THE THEW SHOVEL COMPANY
LORAIN, OHIO



13/4-YD. LORAIN-80

DUNKED IN F FOR LONGI

Purple Strand Wire Rope

This length of hemp rope is about to become the center of a piece of Bethlehem Purple Strand wire rope. Every fibre of this hemp rope has been impregnated with a compound that both lubricates and preserves.

Now, as a further protection, the hemp core plunges into a vat of hot lubricant, emerges with a thick, smooth coating and is pulled, together with the strands, into the closing die. Here the strands close around it. The hot lubricant is squeezed uniformly into every nook and cranny, and the rope is ready for shipment.

When you consider that the strands in Bethlehem wire rope are themselves bathed with a lubricant which is basically matched to the core lubrication, you see how thoroughly Bethlehem handles this important problem.

Why not try Bethlehem Purple Strand on your own job? It's made of premium Improved Plow Steel, is manufactured on new machinery; its individual parts fit together with accurate precision. The performance record of this fine rope is its best salesman.





BETHLEHEM STEEL COMPANY



YOUR PAVING TEAM FOR AL

BLAW KNOX

- If you want to step up your paving production for maximum yardage and profits, get this winning team on your side.
- Mechanized Production Units the new Blaw-Knox CONCRETE SPREADER and the new Blaw-Knox Model "X" FINISHING MACHINE, working together or separately, are today's most widely discussed developments in the paving industry.
- Either machine can be equipped with vibration the most modern and practical vibrating equipment on the market.
- Sure we'll be glad to tell you about this famous paving team for wide and narrow pavements. Ask about the movies that show this winning team in action on concrete slab construction.

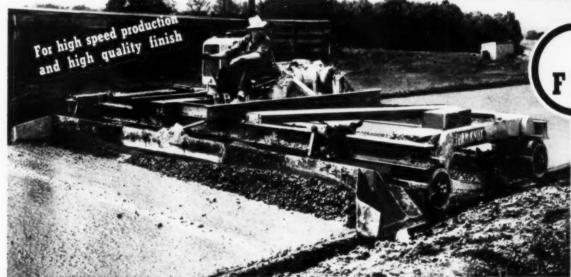
BLAW-KNOX DIVISION

of Blaw-Knox Company

2086 Farmer's Bank Building - Pittsburgh, Pa. Offices and Representatives in Principal Cities



VIBRATORS



ROAD FINISHERS

BLAW-KNOX BINS AND BATCHERS . ROAD FORMS . STREET FORMS . CONCRETE SPREADERS . TAMPING ROLLERS . VIBRATORS CONCRETE BUCKETS . CLAMSHELL BUCKETS . TRUCK MIXERS . STRIPING MACHINES . TURNTABLES . ROAD FINISHERS . STEEL FORMS

5 Reasons Why VENTUBE's Used on so Many Big Jobs



FLEXIBLE AS A HOSE. "Ventube" can go up and down steep inclines
—turn sharp corners—go in and out of irregular passageways—and
yet still keep a smooth interior for the unimpeded flow of fresh air.
"Ventube" reduces air loss to a minimum. Sections are securely joined by
air-tight detachable couplings to prevent leakage. You'll find "Ventube"
is the cheapest, most effective way yet found to ventilate your tunnel.

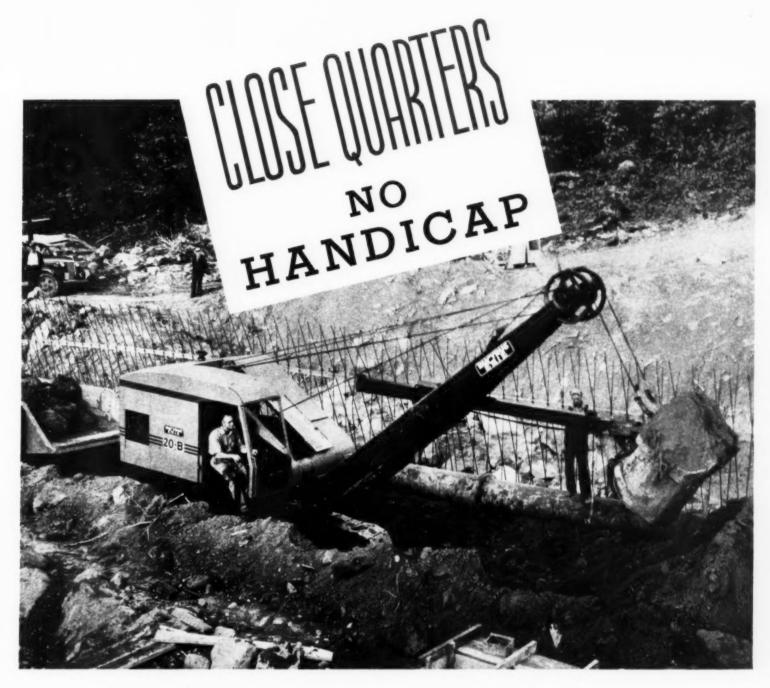
5 MADE BY DU PONT. "Ventube" is made of carefully selected cotton cloth woven to high Du Pont standards. Even the thread that goes into the making of "Ventube" is chemically treated to resist fungus growth. Then the fabric is both coated and impregnated with rubber that makes it resistant to acid, gases, fungus and moisture! Ask Du Pont to give you an estimate for ventilating your next job.



E. I. DU PONT DE NEMOURS & COMPANY (INC.)
"FABRIKOID" DIVISION · FAIRFIELD, CONN.

"Ventube" is Du Pont's registered trademark for its rubber impregnated flexible ventilating duct.
THE FLEXIBLE VENTILATING DUCT This roomy, compact powder lag is made of the same sturdy material as is "Ventube." The seams are severed as tough as rehide—and the fabric is coated and impregnated with thick, recitatant rubber. Du Pont powder bags are available in several sizes. Write for campions information.

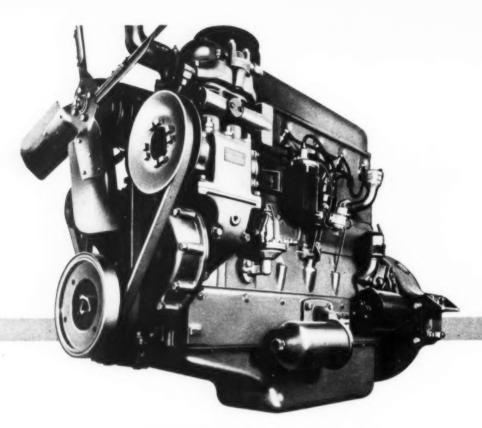




Modern Bucyrus-Erie design lets you work in tight places, a feature that pays off in speed on jobs like this. Owned by Reed & Kuhn, this ¾-yard 20-B is working on a highway curve-elimination job outside Wilkes-Barre, Pa. As a shovel, the 20-B digs bridge foundations, excavates footings for arches, and grades. Converted on

the job to a crane, the same rig handles concrete pouring. Clearance radius of the 20-B with standard counterweight is only 8' 5½". Other Bucyrus-Erie "handy-men" that are close-quarter specialists are the 3/8-yard 10-B, with 5' 7" clearance radius, and the ½-yard 15-B, with 7' 6" clearance radius. Write for full details.

Bucyrus Erie



New GMC 477 Engine Develops GREATER SUSTAINED TORQUE

than any other truck engine in its class!



Now, GMC gives you more power than ever for the heaviest types of hauling and largest dump truck operations. This new 447 cu. in. Super-Duty Engine delivers 152 horsepower at 2400 r.p.m. It develops 382 lbs. ft. torque at 1000 r.p.m., and 350 lbs. ft. at 2200 r.p.m. Here's PER-FORMANCE no other comparable truck engine can match. You can get this new, more powerful engine in GMC trucks and tractors in the 8-18 ton capacity range. See your GMC dealer for full information.

Our own YMAC Time Payment Plan assures you of lowest available rates

HIGHER COMPRESSION makes the difference

Turbo-Top Pistons in GMC Super-Duty Engines control combustion, permitting ideal spark advance for high-compression efficiency. That's why General Motors Trucks outpull all others, in every engine size.



GASOLINE and DIESEL TRUCKS OF VALUE

In these days—would you buy a hack saw which lasted twice as long?



"Obviously-yes"-you say. "So what?"

Only this—that we are trying to point out you can find the same difference in wire rope that you do in a hack saw.

for Greater SPEED, ECONOMY and SAFETY

HAZARD LAYSET Preformed

wire rope Hazard LAY-SET <u>Preformed</u> invariably gives much longer and better service. That means fewer machine shutdowns—better production—more efficient operation. In short: Speed—Economy—Safety.

Hazard LAY-SET Wire Ropes will do this because they are preformed. "Preforming" is a mill process which places every wire and strand in a relaxed condition. This elimination of internal stresses within the steel gives LAY-SET extreme resistance to fatigue—and that means longer life. In addition, the preforming process makes LAY-SET resist kinking, handle easier and faster. It eliminates all necessity for seizing the ends, makes it safer for workmen to handle.

For longer rope life, fewer machine shutdowns, increased production, reduced injuries to workmen—specify Hazard LAY-SET Preformed Green Strand. All Hazard ropes identified by the Green Strand are made of Improved Plow Steel.

HAZARD WIRE ROPE DIVISION • WILKES-BARRE, PENNSYLVANIA

Established 1846

AMERICAN CHAIN & CABLE COMPANY, INC.

District Offices: New York, Chicago, Philadelphia, Pittsburgh,
Fort Worth, San Francisco, Denver, Los Angeles, Atlanta, Tacoma

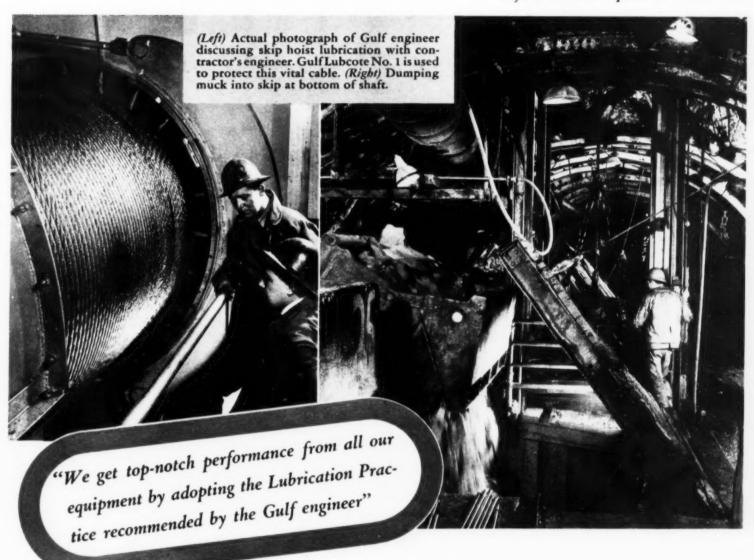


"Above ground and underground

QUALITY LUBRICANTS

help speed up our job . . ."

says Delaware Aqueduct Contractor



O keep ahead of contract schedule on this urgent project, we've got to have really effective lubrication," says this Delaware Aqueduct contractor. "We can't take a chance on equipment failures or delays cropping up. That's why we standardize on Gulf quality lubricants, as recommended by the Gulf engineer."

Leading contractors, not only on this huge tunnel but on many other important projects report definite benefits from the use of Gulf quality lubricants and cooperative engineering service. Are you interested in improving the performance of your equipment and speeding up your job?

Ask the Gulf engineer in your vicinity to recommend the proper lubricants and fuels for each piece of equipment you are using. His recommendations are based on broad experience and knowledge gained through daily contacts in the field. His one big aim is to help speed your work.

No matter where your job is located, Gulf's higher quality lubricants and fuels are quickly available through more than 1200 warehouses located at prin-



cipal distributing points from Maine to New Mexico. Write or phone your nearest Gulf office today.

GULF OIL CORPORATION · GULF REFINING COMPANY · PITTSBURGH, PA.

March 1941 - CONSTRUCTION METHODS - Page 35

Soft Beds

MAKE FIDGETY ROADS!



Groundwater is an unwelcome bedpartner for any road. It softens the subgrade; gives road surfaces the fidgets and makes them easy prey for traffic blows. The only cure is to oust the intruder and prevent its return. You can do this with Armco Perforated Pipe.

This durable pipe meets every requirement for a good subdrainage system — one that will function efficiently year after year and protect your major investment in road materials.

First, Armco Perforated Pipe is amply strong to withstand heavy, pounding traffic. The flexible, corrugated metal design sees to that. Second, it is highly efficient. Uniformly spaced perforations admit water freely and there is little chance of silt or tree roots clogging the line. Sturdy band couplers make tight joints that are unaffected by shifting soils or frost action. Long material life is also assured. Armco Ingot Iron has demonstrated its durable

qualities in 35 years of service.

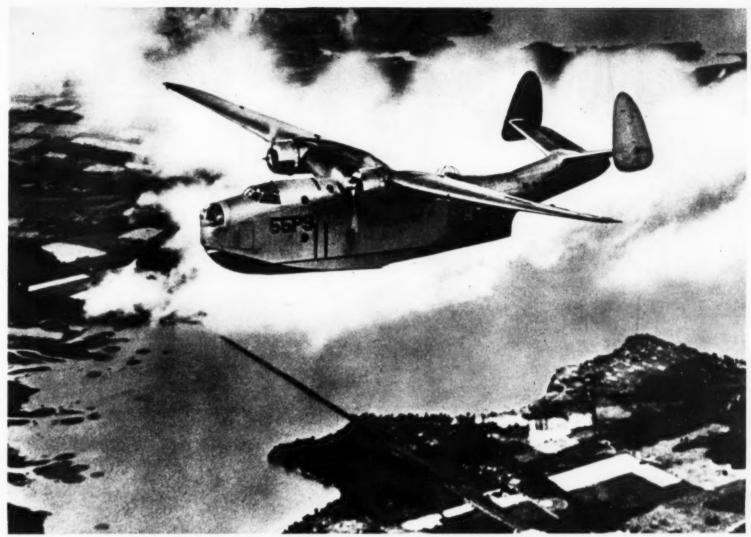
All this guards against premature failure. Remember, you rarely can tell when a subdrainage system fails until it is too late. Then your roads break up and expensive repairs begin. Now ask yourself whether you can afford to

take this chance. The safe, economical way to avoid future trouble and expense is to use Armco Perforated Pipe. This way you know your roads are well protected. Just write us for data and prices. Armco Drainage Products Assn., 5026 Curtis St., Middletown, O.

ARMCO



PERFORATED PIPE

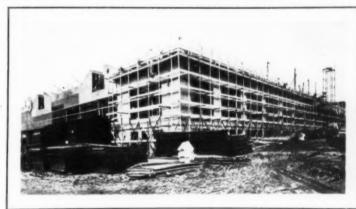


Martin PBM-1 long-range patrol bomber for the U. S. Navy. Photo by courtesy of Glenn L. Martin Co.

More planes ** for time is flying, too!

More planes, America! And bigger plants to make more planes! $^{\dot{}}$ $^{\dot{}}$ $^{\dot{}}$ $^{\dot{}}$ $^{\dot{}}$ $^{\dot{}}$ $^{\dot{}}$ $^{\dot{}}$ $^{\dot{}}$ $^{\dot{}}$ At Middle River, Md., the addition to the Glenn L. Martin Co. airplane plant is well ahead of schedule. One reason why is the use of Lehigh Early Strength Cement. With it the contractor pours concrete one day, strips forms the next, goes on with other work without delay.

What makes Lehigh Early Strength Cement a "natural" for high-speed construction work—defense or otherwise—is this: It makes service-strength concrete 3 to 5 times faster than normal portland cement. It gives you the advantage of better job coordination, earlier occupancy and use, fewer forms, less danger of damage by frost, shorter period of heat protection. \(\frac{1}{12} \) \(\frac{1}{12} \) \(\frac{1}{12} \) \(\frac{1}{12} \) For better, denser, finer-surfaced concrete—at speed that means economy—use Lehigh Early Strength Cement. The Lehigh Service Department will gladly answer questions.



ONE OF THE ADDITIONS TO THE GLENN L. MARTIN CO. PLANT
Military Bay, Middle River, Md.
ARCHITECT: Albert Kahn, Inc., Detroit, Mich.
CONTRACTOR: Consolidated Engineering Co., Inc., Baltimore, Md.



Lehigh EARLY STRENGTH CEMENT

LEHIGH PORTLAND CEMENT COMPANY . ALLENTOWN, PA. . CHICAGO, ILL. . SPOKANE, WASH.





Caterpillar Diesel Motor Grader with Goodyear Sure-Grip tires on Pennsylvania turnpike

In off-the-road work there's an important relation between the size of your tires and your profits. Experience proves it pays to use bigger, wider tires than in normal highway service, for these three important reasons:

BIGGER TIRES provide sufficient air-cushion underwheel to "float" loads over soft surfaces where ordinary tires bog down-insure faster operation.

BIGGER TIRES "flow" over rocks without gouging or cutting – give longer wear.

BIGGER TIRES roll freely without bead strain or rim-cutting – prevent carcass failures.

To give contractors these advantages, Goodycar builds off-the-road tires in sizes up to 24.00 inches cross-section - in three different types of tread specially designed for mud, rock and dirt operations.

You will find these tires today on many of the largest earthmoving vehicles because they carry full-capacity loads at higher speeds — with greater maneuverability — and because they give longer service.

If you want these double savings, see your Goodyear dealer about the proper size and type of Goodyear tire for your equipment.

All Weather - T. M. The Goodyear Tire & Rubber Company



GOOD YEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Page 38—CONSTRUCTION METHODS—March 1941

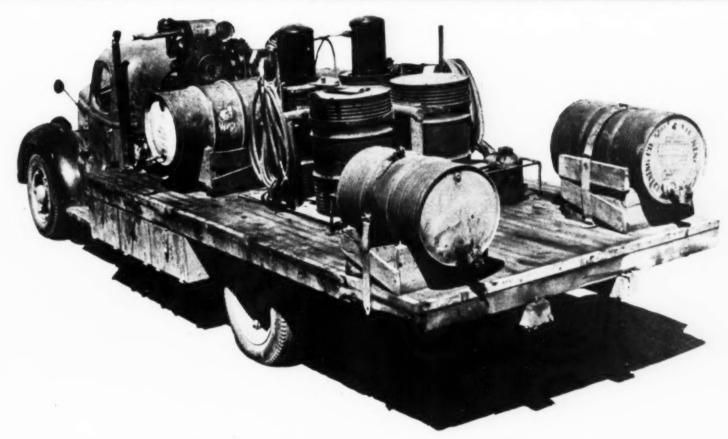
Construction Methods

ROBERT K. TOMLIN, Editor

Volume 23

MARCH, 1941

Number 3



Greasing Construction Equipment AT FRIANT DAM

A GREASE TRUCK equipped with everything needful for effective lubrication service on a construction job, dashes about the work at Friant Dam, U. S. Bureau of Reclamation project in California, on a three-shift working schedule, servicing all classes of construction equipment with lubricants ranging from light oils to heavy greases. During the preliminary construction stage, with working equipment all at ground level, this one truck is meeting all lubrication requirements of Griffith Co. and Bent Co., contractors.

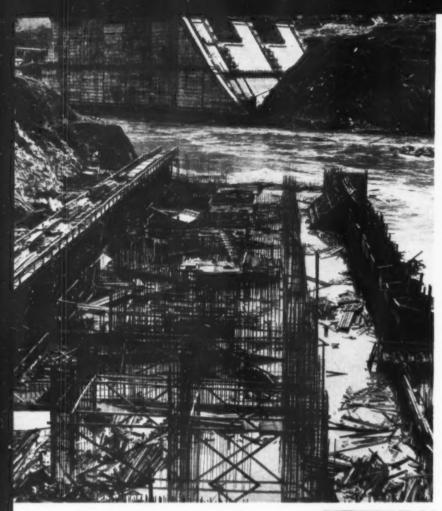
Its equipment includes an Ingersoll-Rand compressor (210 lb. per square inch) driven by a Wisconsin (type AH) gasoline engine and grease guns that develop ratios of 20 to 1, 30 to 1 and

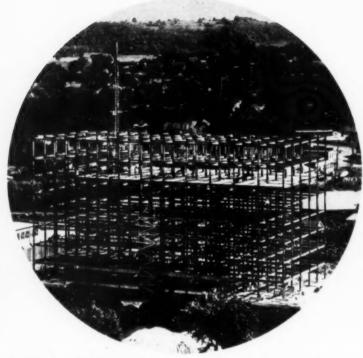
One Month's Supplies of Oil and Grease Used on Construction Equipment by One Grease Truck.

Chassis lubricant	1,600 lb.
Caterpillar track grease	7,600 lb.
Compressor oil	104 gal.
Rock drill oil	416 gal.
Gear oil (shovels and cats)	1,200 lb.
Lubricating oil (caterpillar diesels)	624 gal.
Air cleaner oil	104 gal.
Lubricating oil (diesel shovels)	884 gal.
Lubricating grease (shovels)	1,705 lb.
Open gear grease	630 lb.
Cup grease	35 lb.
Gear oil	1,000 lb.
Crank case oil (gasoline engines)	260 gal.
Misc. oils and greases200	to 300 lb.

40 to 1, used respectively for pressure chassis lubrication (1,200 lb. per square inch), gear case greases and button head services of the tractor type. In addition to oils, the truck carries five kinds of grease which meet the needs of 12 tractors, 23 trucks, 3 dinky locomotives, 3 power shovels and numerous smaller items of construction equipment.

The truck is a 1½-ton International and the crew in each shift consists of three men. No definite hours are specified for being at certain parts of the job, but the truck goes out every 4 hr. on a service trip that usually requires about 1½ hr., after which special grease jobs are done until time for the next round. The accompanying list of lubricants was dispensed in a 30-day period.





ALL-WELDED STEEL FRAME is structural feature of new 14-story state office building at Frankfort, Ky., now completed, but shown in this view before inclosure. Building is 214x84 ft. in plan and required 1,470 tons of steel. Contractors were Skilton Construction Co., of Louisville, Ky., for superstructure with bid of \$450,583 and Spencer & Ross, of Detroit, for pile substructure with bid of \$104,383.

OVERFLOWING DIVERSION CHANNEL through which it passes damsite, Sacramento River, swollen by winter rains, floods powerhouse construction area of Shasta dam, U. S. Bureau of Reclamation project in California. At time of mishap about 40,000 cu.yd. of concrete and 1,700 tons of steel reinforcement had been placed for powerhouse structure by Pacific Constructors, Inc.



TRAINLOAD OF CONCRETE (below) is delivered in five 4-cu.yd. bottom-dump buckets for placement by overhead crane in Friant dam, U. S. Bureau of Reclamation project in California. Constantly running back and forth between mixing plant and tall steel construction trestle erected by Griffith Co. and Bent Co., contractors, are seven concrete trains hauled by 10-ton diesel-electric locomotives.



AT MUD MOUNTAIN DAM. 425-ft. high rock fill with rolled earth core on White River in Washington, material for big embankment is hauled by International trucks with special large-capacity dump bodies. Spreading is aided by diesel-powered International tractors equipped with bulldozer blades. Operations illustrated herewith are being done by White Bros., contractors of Walla Walla, Wash., under subcontract with Guy F. Atkinson Co., of San Francisco, which holds \$5,344,605 contract for U. S. Engineer Department project.

ANOTHER BIG CANTONMENT PROJECT (below) for U. S. Army takes form at Camp Edwards, in Massachusetts, under direction of Quartermaster Corps. Here are shown only few of wood barracks, mess halls and other structures built by Walsh Construction Co. to house troops at Falmouth, Mass.



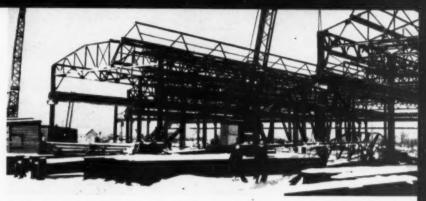
THIS MONTH'S NEWS BREEL



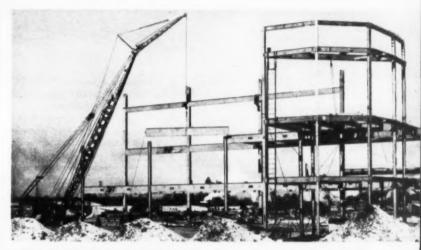
AT CAMP SHELBY, big Army reservation in Mississippi, modern sewage treatment plant is being constructed under direction of Quartermaster Corps.

1,000,000-SQ.FT. ADDITION (right) to No. 2 plant of Boeing Aircraft Co. in Seattle, Wash., is nearing completion by The Austin Co., engineers and builders, of Cleveland, Ohio. Huge steel trusses of 300-ft. span are features of assembly bay where Flying Fortress planes will be produced. Each of four of these trusses weighs 98½ tons and one other truss weighs 112½ tons. To meet time limit of 140 days set for completing plant addition The Austin construction crew of 1,400 men has been working night and day in two shifts.

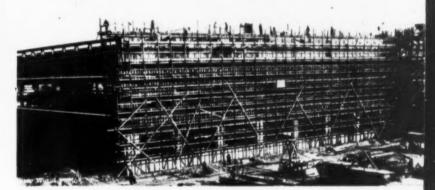




ARMY TANK ARSENAL for Chrysler Corp. in Detroit, Mich., to cost \$20,-000,000, is under construction by O. W. Burke Co. Main building, 1,380 ft. long and 500 ft. wide is of one-story monitor-type steel design, with continuous steel sash and brick curtain walls. Central machine shop area between two bays, one for assembly and other for railroad delivery and stocking of materials, will have clear height of 30 ft. over heavy machinery section and 21 ft. elsewhere.



NEW FORD AIRPLANE ENGINE PLANT at Dearborn, Mich., as it appeared during early stages of steel erection for 360x1,000-ft, structure being built by Esslinger-Misch Co., general contractors, of Detroit, to provide 900,000 sq.ft. of floor space for producing 18-cylinder Pratt & Whitney engines of from 1,850 to 2,000 hp. Cost of project will be \$21,000,000 for building and equipment. Job involves 9,000 tons of steel for frame of building and 4,000 tons of steel piling driven 100 ft, to bedrock for substructure. Work is being rushed on 24-hr.-per-day schedule.



INCREASED AIRCRAFT PRODUCTION will be made possible by this new plant nearing completion for Vega Airplane Co. at Burbank, Calif. Contractor on \$2,000.000 project is S. Simpson Construction Co.



FORT DEVENS CONSTRUCTION

Employs 14,000 Men

ON 1,011 WOOD BUILDINGS

TO PUT THROUGH a \$20,-000,000 construction program normally requiring 18 months in only 4 months was the problem of the U.S. Army authorities, engineer-architect, contractors and personnel at the Fort Devens, Mass., cantonment near Ayer, Mass., where 23,221 men are scheduled to be stationed in connection with the military training and defense plans of the War Department. The project included the erection of 1,011 buildings, roads, sewers, water supply, electrical facilities, and communication for a sizeable city on an irregular terrain with severe climatic conditions (winter temperatures to -20 deg. F.). High ground is 140 ft. above Nashua River level; grades at individual buildings may vary 6 to 8 ft.; the active portion of the reservation covers some 6 sq.mi.; and a 6,000-kva. substation had to be provided to supply purchased power to the area. Two large hospitals, one local and one regional, had to be built opposite the main camp, necessitating the



HIGH SPOTS OF FORT DEVENS CANTONMENT CONSTRUCTION

Program represents outlay of about	\$20,000,000
Time4 mon	ths' objective
Number of buildings	1,011
Troop capacity of program	23,221
Number of employed personnel at peak, about	14,000
Miles of water lines, approximate	18
Miles of sewer lines	22.5
Miles of roads in cantonment, new	20
Feet of lumber required, approximate	45,000,000
Number of bridges built	2
Cu.yd. earth excavated, about	1,500,000
Value of construction equipment about	\$500,000
Minimum temperature level winter '40-41	20 deg. F.
Acres of land cleared	500



MAJOR L. K. WARNER, constructing quartermaster, is in charge of \$20,000,000 building program at Fort Devens.

construction of a semimilitary bridge across the Nashua River for quick access (one month's achievement), and major highways capable of handling the most modern motorized combat units.

The work, being done under a fixed-fee form of contract, is in charge of Major L. K. Warner, constructing quartermaster, the engineer-architect being F. A. Barbour. The principal contractors are the Coleman-Bowen Co., J. W. King, general superintendent. Col. W. A. Smith was post commandant until January, when Brig.-Gen. John Magruder took over.

About 14,000 men were utilized on the construction job at the peak. The labor supply was readily obtained, without advertising, from points generally within 50 mi. of the fort, which is 38 mi. west of Boston and still nearer Worcester, Lowell, Lawrence and other populous centers. Quarters for the construction forces were not required to be built by the government, commut-

(Continued on page 44)



FOR CONTRACTORS, Coleman-Bowen Co., of Boston, WILLIAM COLEMAN (left) is treasurer and RAYMOND MOORE superintendent of construction.





GENERAL SUPERINTENDENT for contractors is JOHN W. KING (left) who works in cooperation with JOHN BOWEN, president of company that bears his name.



FILL FOR NEW BRIDGE CONSTRUCTION near cantonment in loaded by Lorain 1¾-yd. diesel-powered shovel into 15-cu.yd. Euclid pneumatic-tired bottom-dump wagon.



 $\begin{array}{lll} \textbf{TRACTOR-HAULED} & \textbf{ROOTER} & \text{breaks up frozen ground to depth of from } 12 \text{ to } 36 \text{ in. preparatory to grading and street construction.} \end{array}$



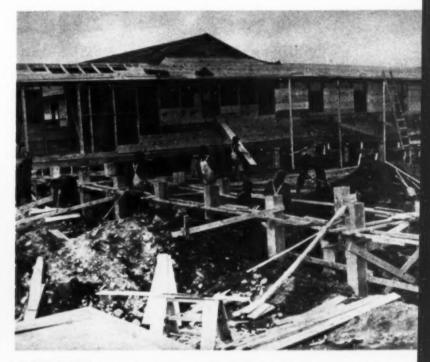
CANVAS INCLOSURE ON CAB of Allis-Chalmers tractor, equipped with bulldozer, protects operator in severe New England winter climate.



TRENCHES for water and sewer lines are excavated by Koehring trench hoe equipped with 3/4-yd. bucket.



ROAD CONSTRUCTION at Fort Devens utilizes 2-yd. Northwest power shovel and 15-cu.yd. Oshkosh bottom-dump wagon for earth-moving operations.



WOOD FORMS for concrete piers are erected by carpenter crew at site of new camp hospital.



INSULATION is applied to walls of 2-story wood barracks structure.



STANDARD BARRACKS unit housing 63 men is two-story wood building 80 ft. long, 291/2 ft. wide and 25 ft. high. Hoods over first-story windows and roof overhang permit ventilation in rainy weather. Side ladders offer means of emergency exit. Buildings are supported by concrete piers.





WOOD-WORKING MILL on camp site, equipped with DeWalt electric powered circular saws mounted on radial arms, prepares lumber for speedy erection of barracks. BEVEL CUT (right) is made by adjusting blade to proper angle.

SEWER TRENCH (below) is backfilled by clamshell bucket on 20-ft. boom of Byers crawler crane



ing to and from the job being general. For the most part, construction work has been carried on 7 days a week and 24 hr. per day. All-night work has been concentrated largely upon the various utilities required, such as water service, sewers, roadways and activities employing considerable numbers of laborers.

The time limits required for completion of the work have greatly increased its cost, but this has been unavoidable. The broken terrain and severe winter weather have played their part, although at this writing suspension of outside work has been practically negligible. The authorities in charge have concentrated upon providing adequate barracks, mess hall and service facilities for each incoming batch of troops as these have arrived, and this schedule has been satisfactorily maintained. This procedure has been followed rather than that of carrying along the entire cantonment at a uniform rate of progress. The anticipated result is that the work as a whole will be completed synchronously with the arrival of the full complement of men. In the first World War the then Camp Devens was a divisional training center, and it has since been utilized for other governmental purposes. Some of the more recently erected



buildings have been utilized by the Army and in the present reception of drafted men. In the main, however, a new layout is required for the current program.

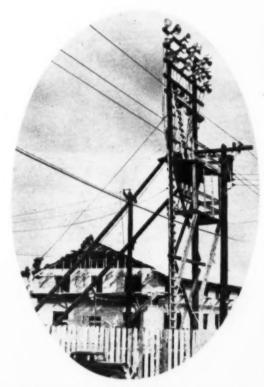
Working Forces

A typical distribution of working forces approximates 1,000 men between midnight and 8 a.m.; 10,000 between 8 a.m. and 4:30 p.m.; and 3,000 between 4:30 p.m. and midnight. The job has required about 7,000 laborers, 3,500 carpenters, 500 plumbers and heating workers; and 300 electric wiremen.

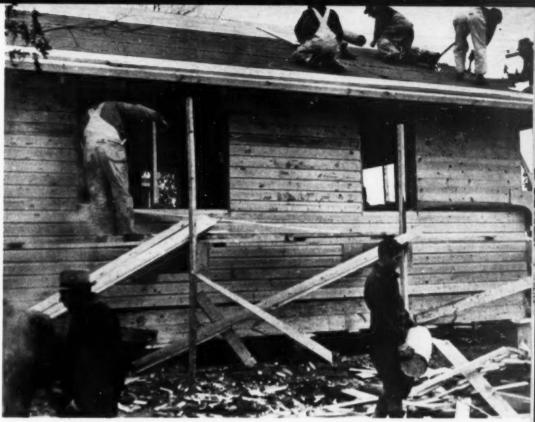
workers; and 300 electric wiremen.

About 45,000,000 ft. b.m. of lumber have been required for the camp buildings. Electrical distribution circuits are designed for 4-kv. operation and power is used for multiple purposes, including the operation of batteries of floodlights for night work, equipment in shops and garages, pumping, driving woodwork-

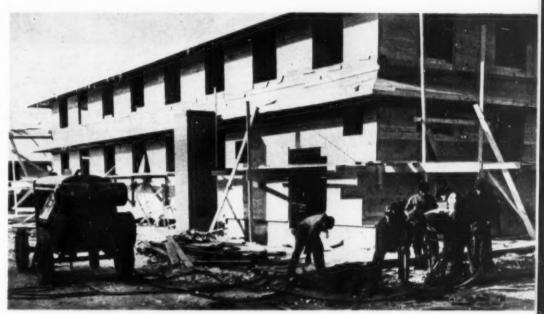
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BATTERIES OF FLOODLIGHTS are mounted on wood towers to illuminate night construction of wood barracks.



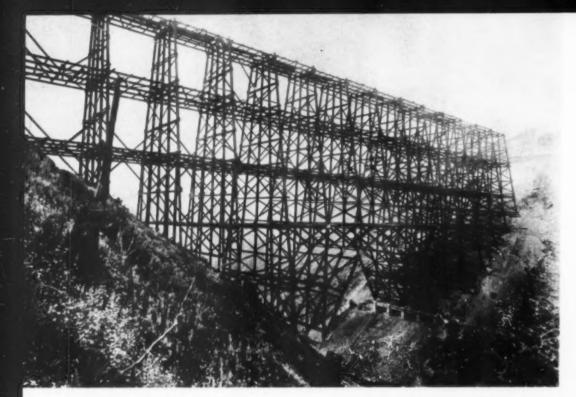
PREPARED ROOFING is placed on wood building to serve as officers mess hall.



FROZEN GROUND is loosened, preparatory to pipe laying, by air hammers served by 210-cu.ft. per min. Worthington portable compressor.

BRIDGE BUILT ON CONCRETE PIERS, (below) with trestle bent approaches, crosses Nashua River to connect cantonment with hospital.

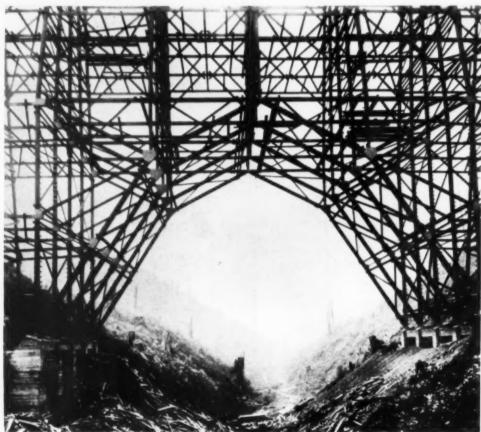




WITH HEIGHT OF 235 FT, and length of 1,130 ft., timber trestle will carry logging trains of lumber company across branch canyon of Coweeman River

Tall
Timber Trestle
BUILT OF BENTS
IN 31-FT. STORIES

PREFRAMED BENTS 31 FT. TALL (below) are placed with aid of cableway to form stories of 235 ft. high timber trestle.



THREE-HINGED ARCH of 120-ft. span carries trestle over river channel.

NEW TECHNIQUE IN THE USE OF TIMBER for heavy construction purposes is exemplified in the recently completed Baird Creek logging railway bridge 235 ft. high, spanning a branch canyon of the Coweeman River in eastern Cowlitz County, Washington. The structure consists of a 250-ft. fir pile approach trestle, a 480-ft. center section of creosoted timber built up from a 120-ft. three-hinged arch in 31-ft. stories, with the bents 30 ft. apart, and a 400-ft. fir pile approach trestle. The bridge is 1,130 ft. long and 235 ft. high, with the central 286 ft. on tangent spiralled in 15-deg. and 16-deg. curves in the approaches. The west approach and creek bottom are solid rock while the east approach is earth.

Creosoted material was shipped to the site in units which consisted of all the timber to make one bent one story high. Each bent consists of two 14x14-in, bat-

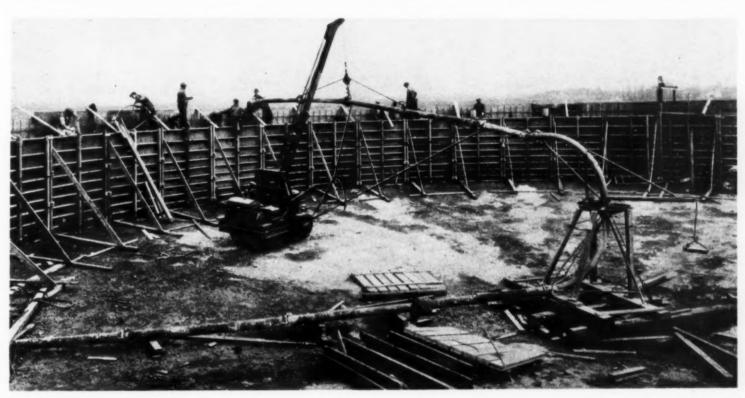


ter posts and one plumb and two rail posts 12x14 in. Sways and sash are 3x 10 in. Tower braces are 4x10 in. Girts are 6x12 in. and girt bracing is 3x10 in.

As an example of the rigidity of the structure the B-story bent was picked up flat with four lines, one on each end of each rail post. This bent is 68 ft. wide at the bottom and 56 ft. wide at the top and the 3x10-in. ring-connected bracing held it together without any bolsters. Each brace has a split-ring Teco timber connector at each end connection. The timber stringers are 30½ in. deep, three to a chord, and two chords to a span. The bridge was designed for

(Continued on page 115)

Swivel-Pipe Distributor PLACES PUMPED CONCRETE



FOR POURING WALLS swivel distributor is cribbed up at center of circular tank, while tractor with 15-ft. boom supports 7-in. discharge pipe line from pumping unit set up under central mixing plant. Outfit placed 15,000 cu.yd. of concrete.

A SWIVEL-PIPE DISTRIBUTOR for use with a Rex Pumpcrete proved to be an effective rig for placing concrete in the primary digestor tanks for the newly completed sewage treatment plant at Hammond, Ind. The contractor, Permanent Construction Co. of Chicago, placed the 15,000 cu.yd. of concrete in this plant with a 200 double pumping unit and 7-in. pipeline. The pump was set up under a central mixing plant and handled pipe lines up to 900 ft. in length.

The swivel was made up of two 90deg. elbows, connected by a tightly sealed rotating joint, which rolled on a turntable and turned 360 deg. in either direction.

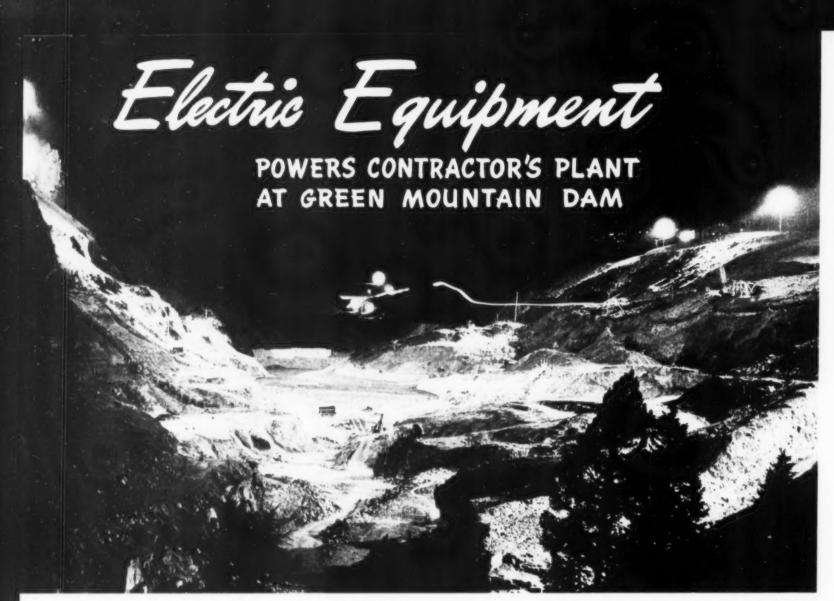
The tanks shown in the illustrations herewith are 110 ft. in diameter and have approximately 330 cu.yd. of concrete in the bottoms and 200 cu.yd. in the 9-ft. walls. The bottoms were poured from the swivel distributor in sectors approximately 25 ft. wide at the arc. Concreting progressed from the arc to the center. As pipe was removed from the end of the line, it was set up in the adjoining sectors for a quick connection after each slice was completed. The swivel was cribbed above grade in the

exact center of each tank, as illustrated.

On outside walls the lead-in pipe was boxed through future connections. A tractor with 15-ft. boom supported the 55-ft. discharge line with a 3-joint sling. A six-man crew moved tremies, vibrated and distributed concrete in horiontal layers at the rate of about 40 cu. yd. per hour. After a pour was completed, tractor and swivel were hoisted from the tanks by a crane. Tag lines attached to the concrete pipe served as a guide to hold the tractor on a true course about an intermediate periphery inside the tanks.



BOTTOMS OF TANKS 110 ft. in diameter were poured in sectors 25 ft. wide at arc from swivel distributor at center.



TALL TOWERS (below) are erected by contractor at strategic points carrying batteries of flood-lights for illuminating damsite.



Page 45

ELECTRIC EQUIPMENT is playing a littleheralded but vital part in the construction of Green Mountain dam, a major unit of the U.S. Bureau of Reclamation's \$44,000,000 Colorado-Big Thompson project. The dam, now under construction on the Blue River, 16 mi. southeast of Kremmling, Colo., will protect water users in the Colorado River basin against depletion of their water supply as a result of diversions through the 13-mi. Continental Divide tunnel (See Construction Methods, February, 1941, p. 58) to northeastern Colorado. With a height of 270 ft., a crest length of 1,300 ft. and a volume of 4,366,000 cu.yd., it will be the second highest and largest earth and rockfill dam in the

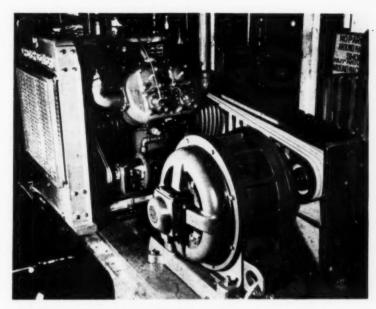
country, being exceeded only by San Gabriel dam No. 1 in California. On a bid of \$4,227,206, Warner Construction Co., of Chicago, obtained the contract for the dam.

The accompanying photographs illustrate various typical applications of General Electric equipment, including motors, floodlights, portable power cable and transformers, on this project. Rough, mountainous terrain, ice and snow, and sudden temperature changes all add to the abuses which electric equipment at Green Mountain dam must withstand. For example, the tellurium-compound portable cable, which feeds power from the substation to the electric

(Continued on page 111)

FREEZING TEMPERATURES (below) impose tough operating conditions on 40-hp., 440-v. squirrel-cage induction motor coupled to centrifugal pump which keeps cofferdam dry.





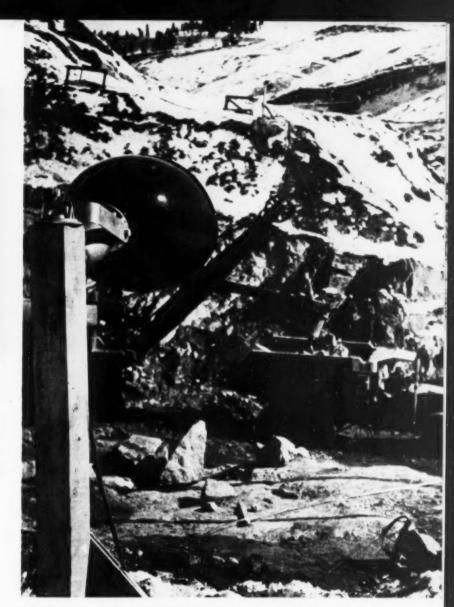
INDUCTION MOTOR, 75-hp., 120-r.p.m., 440-v., 3-phase, 60-cycle unit, operates air compressor through V-belt drive. Six of these units supply air for drilling, grouting and other construction uses.

MOBILE GRAVEL PLANT (below) mounted on heavy crawler treads screens material loaded by electric power shovel. Plant is powered by nine gear motors of 30, 40 and 75 hp., each controlled either by general purpose magnetic switch or reversing magnetic switch. Three 75-kva. and one 3-kva. transformers and several thousand feet of portable power cable are included in equipment used.



TRANSFORMERS (below) with rating of 25 kva. reduce voltage from 2,200 to 110 for operating floodlighting system. They are fed by tellurium-compound cable and are equipped with fuse cutouts.





EXCAVATION AT POWER HOUSE SITE is done by electric shovel loading into 24-cu.yd, diesel trucks with special heavy-duty bodies. In foreground, floodlight mounted on post is available for night work.



TELLURIUM-COMPOUND CABLE delivering electric power to shovels is called upon to withstand considerable abuse while being dragged over rough ground to follow movement of machines.

ELECTRIC POWER SHOVEL (below) served by tellurium-compound cable loads material at portable screening plant.





CEMENT HOPPER over conveyor tank (installed below deck in cement barge) is filled by mobile gasoline-powered hydraulic-lift shovel. Two small valves in cabinet at right control air rams operating cement-charging gate and compressed-air line into conveyor tank.

Air-Activated Conveyor UNLOADS BULK CEMENT

TO REDUCE THE LABOR, time and cost of unloading bulk cement from barge to bins on shore, the Dwyer Lighterage Co., New York City, installed on one of its 4,000-bbl. cement barges a Robinson air-activated conveyor system which was recently observed putting 32-bbl. shots of cement through 4-in. pipe into bins of the J. & I. O'Rourke ready-mix plant, Flushing, N. Y., in 4½ min., using air at 22-lb. pressure furnished by a 285-c.f.m. compressor. The pipe was about 200 ft. long, including a 60-ft. riser into the bin. Inside the barge, a Butler self-propelled cement shovel with a bucket of 900-lb. lifting capacity scooped up the cement in 6-cu.ft. bites and delivered it to a hopper over the conveyor tank, which is set below deck in the hull of the barge. One man operated the mobile cement shovel, and another manipulated ½-in. air valves controlling the cement gate and the compressedair line into the conveyor tank.

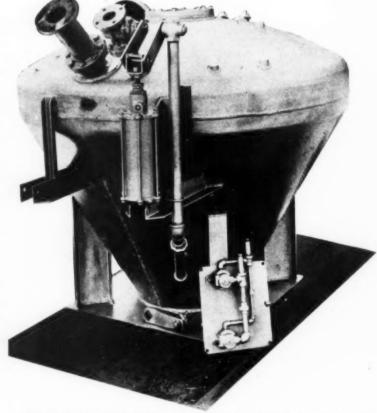
Although a 5-in. pipe normally is used with the conveyor system, the unit put cement through the permanent 4-in. pipe at the O'Rourke plant without difficulty. A rubber hose connected the discharge pipe of the conveyor tank with the 4-in. pipe on shore. The tank, illustrated by an accompanying photograph, is a cone-shaped drum of 32-bbl. capacity, with side walls sloping at an angle of 60 deg. Cement was fed into this drum by gravity through a hermetically sealed gate operated by an air ram inside the tank. A cone-shaped suction hood near the bottom of the tank picked up the cement and passed it into the discharge line. Surrounding the suction hood inside the tank is a patented aerating system through which air is admitted into the cement.

At the start of each 32-bbl. cycle, the hermetically sealed gate at the top of the tank was opened to admit a full charge of cement. When the tank was filled, a red light mounted above the control valves flashed a signal; this light was

operated by an indicator inside the tank. The operator then manipulated the two small valves to close the gate and to open the compressed-air line into the tank. Pressure inside the tank built up to 22 lb. per square inch, as indicated by a dial gage mounted in the control panel. Incoming air admitted to the tank aerated the cement and fluidized the entire content, permitting the cement to flow on the 60-deg. slope to the cone-shaped pick-up hood.

After about 3 min., the pressure began to drop, indicating that most of the cement had been transported out of the tank and that the load in the conveyor pipe was diminishing. When the pressure had dropped to about 5 lb., the operator closed the air inlet valve, controlled by a second air ram on the side of the tank, and the movement of the ram simultaneously opened a bypass vent from the top of the tank into the conveyor line. The remaining compressed air in the tank escaped through this vent into the discharge line and blew the conveyor pipe clear of cement, ready for the next cycle of operation.

An advantage of the conveyor is that it works entirely on compressed air and requires no other form of power. Units of the 32-bbl. size are in use for car unloading by contractors on several dam jobs, where the conveyors are delivering cement through 6-in. pipe lines up to ½ mi. long. Other units in smaller and larger sizes are installed in readymix plants and cement mills, conveying cement through 5-in. pipe up to 1,000 ft. in length and through 6-in. lines for greater distances.



CONE-SHAPED STEEL TANK of this type is installed below deck in hull of cement barge. Air ram mounted on side of tank operates compressed-air line and bypass vent. Detached control panel resting against welded upright is fitted with two small valves for operation of this air ram and one other controlling cement-charging gate.



PLACER GOLD is being recovered at rate of about 5c. per cubic yard of material handled from sand that goes into concrete at Friant dam, being built in California by Griffith Co. and Bent Co. for U. S. Bureau of Reclamation. Operator of amalgamator is pointing to accumulation of flake gold and mercury on unit of plant installed by contractors at cost of \$20,000.



LIKE FLIES IN A SPIDER'S WEB these workers wire up 5,000 tons of 2-in. steel reinforcing bars for 10 concrete piers and four abutments of great Pit River bridge which U. S. Bureau of Reclamation is building to carry railroad and highway traffic around site of Shasta reservoir, key feature of Central Valley project in California.



JUST A MOUTHFUL for this big 12-cu.yd. dragline bucket of Callahan Construction Co. on U. S. Bureau of Reclamation's All-American canal in California is this Ford sedan.



PAPER WORK A' PLENTY—20 tons of it—is indicated by this truck and trailer load of records accumulated during 6½ years of construction on Mono Basin project in California of Los Angeles Department of Water and Power, involving dam, conduit and 11-mi. tunnel. Included in field records delivered to Los Angeles headquarters from six construction camps are time and equipment cards, invoices, requisitions, purchase orders, hospital forms and engineering data.

TYPICAL FOREST TRAIL built and maintained by Forest Service utilizing C.C.C. forces in Superior National Forest, Minnesota.

Photos, U. S. Forest Service

SNOW REMOVAL (below) on timber line road in Mt. Hood National Forest in Oregon is speeded up with aid of this machine.



MAINTAINING 100,000 MILES 0



MIDGET TRAIL-BUILDER is designed with narrow gage to operate at low cost in timbered areas where larger machine could not maneuver effectively. Overall width of tractor is 36 in. and of bulldozer frame 45 in. Length 6 ft. 10 in.; height, 3 ft. 8 in.; weight, bare, 2,800 lb. and with bulldozer, 3,600 lb. Has power takeoff for driving special attachments such as water pump, drum hoist or compressor.



BLADE GRADER hauled by tractor maintains road in Piedmont Ranger District of Missouri's Clark National Forest.



GIANT BRUSH STRIPPER drawn by tractor is effective for land clearing in Shasta National Forest, California.

PORTABLE ROCK CRUSHER (below) produces stone for surfacing road in Santa Fe National Forest in New Mexico.



OF Mational Forest Roads



FOR CLEARING SCRUB OAK in Virginia bulldozer blade is equipped with shovel teeth.



THE UNITED STATES FOREST SERVICE, as explained in the following notes prepared for CONSTRUCTION METHODS by Clifford A. Betts, engineer for the Service, with headquarters in Washington, D. C., is primarily interested in reliable service roads that will permit access to to the forests for fire fighting, logging, grazing, mining, recreation, fishing, huntting, and other preservation, utilization and administrative purposes. Since the early days of the Forest Service more than 40 years ago when much of the transportation in the forests was by pack train, there has been developed a road and trail system more than 100,-000 mi. in length which serves the 175,-000,000 acres of national forest land on the 160 national forests scattered over 36 states, as well as in Puerto Rico and Alaska. The area served by the roads is so extensive that it has been necessary to spread the road funds comparatively thinly, keeping the width standards down to the minimum that will handle the required traffic. As mileage mounts, it is increasingly important to keep maintenance down to a min-

The first step in accomplishing this has been to improve the methods of construction, to provide good subdrainage as well as adequate surface drainage, to treat side banks so that they will not slough into the gutters, to pro-

vide road surfaces sufficiently heavy to withstand the loads that must be carried, and finally, to select surface material that will stand up under traffic and not blow away as dust or wash away as mud.

Motorized maintenance equipment, including motor patrols, snow plows, and trucks, aids greatly in increasing the efficiency of maintenance. Another important step has been the working out of adequate maintenance programs for the various types of roads and planning the work so that crews on the roads can also be available for forest fire fighting—no small item.

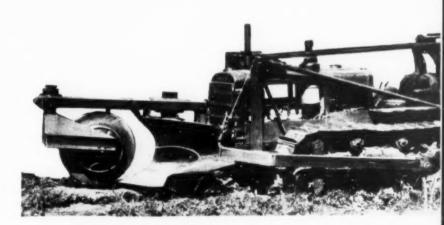
It is estimated that accessibility to fire-threatened forests provided by these roads and trails has saved more than the cost of the roads in timber preserved from destruction. In one region alone, trails costing \$8,000,000 are reported to have saved \$258,000,000, these figures having been arrived at by comparing similar burns before and after trails were available.

For fire control trails for fire fighting through the heavy

(Continued on page 106)

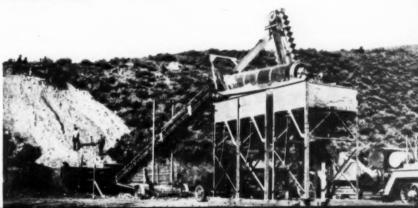


TOUGH GOING in mountainous country is encountered by this Caterpillar tractor equipped with Le Tourneau bulldozer in Tulare County, California.



TRACTOR PLOW developed by Forest Service in Minnesota for preparing furrows for planting

CRUSHING AND SCREENING PLANT (below) operated by CCC personnel in Idaho produces road surfacing material for 19 mi. of forest road in Pocatello Division.



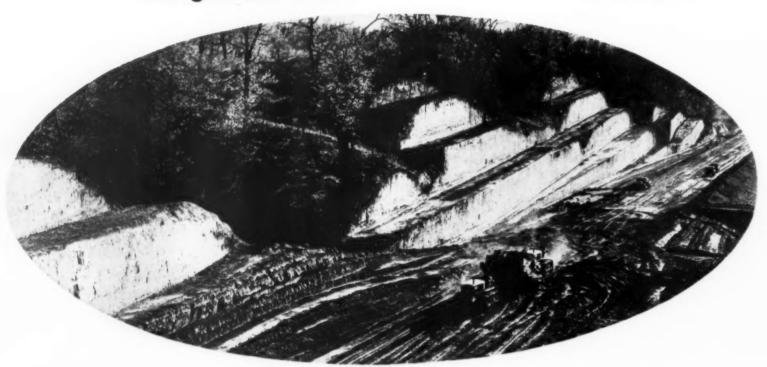


Stepped Cuts With Vertical Faces, Made in 15-Ft. Lifts Through Loess Bluffs

meet metropolitan building code requirements, deep cuts through loess bluffs on a 3.94-mi. relocation of Iowa State Route No. 127 between Magnolia and a connection with U. S. 75 have been made in the form of a series of terraces with vertical faces, excavated in 15-ft. lifts with standard grading equipment. The project, involving the movement of 800,000 cu.yd. of earth for cuts and fills, was handled by Frank Eblen, contractor, of Cumberland, Ia., with a fleet of pusher-loaded carrying scrapers of 20-cu.yd. capacity drawn by crawler tractors.

The peculiar physical characteristics of the loess soil along the route of the new road made possible the form of vertical-faced step-back cuts illustrated herewith. Experience indicated that the loess soil stands up best in cuts with vertical, rather than sloping, faces over which drainage water is prevented from

(Continued on page 112)

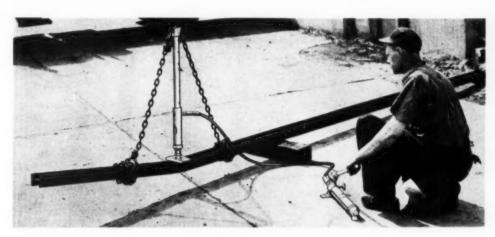


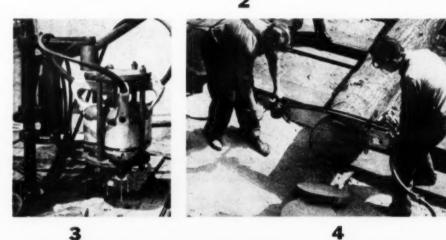
TRACTOR-SCRAPER OUTFITS, with auxiliary pusher units to expedite loading, excavate cut through loess bluffs in 15-ft. lifts with vertical faces.



PERPENDICULAR FACES of terraced cuts are made possible by physical character of loess soil through which relocated road passes. Horizontal benches are sloped back to drain rain water away from face.







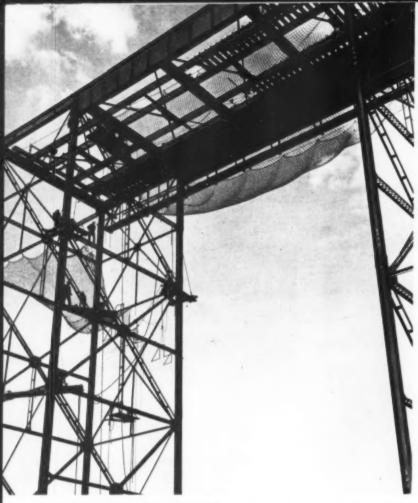


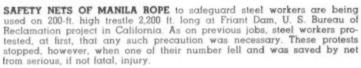
5





- **1** HOLES FOR BOLTS in wood planking at Friant dam, U. S. Bureau of Reclamation project in California, are bored by compressed-air auger (Ingersoll-Rand) operated by worker of Griffith Co.-Bent Co., contractors.
- **2** BEND IN STEEL I-BEAM to serve as monorail for carrying chain hoist or other material-handling equipment around corners, pillars or other obstructions is readily made by application of Porto-Power hydraulic jack (Blackhawk) operated by hand pump.
- 3 FOUR NAIL HOLES, to prevent splitting, are drilled simultaneously in members of wood roof trusses for Sunnydale mass housing project at San Francisco, Calif., using four utility electric hand drills (Van Dorn) mounted on single Van Dorn bench drill. Barrett & Hilp were contractors on project.
- 4 CHAIN SAW with piston type air motor (Mall) makes quick work of such jobs as cutting wood piles above or under water, felling large trees and sawing heavy lumber. With 3.5-hp. motor air consumption is 95 cu. ft. per min. at 90-lb. pressure. Cutting capacity 24 in. Free speed of chain in 1,000 ft. per min. Saw weighs 50 lb.
- 5 FOR COMPACTING FILL around building foundations at Potrero mass housing project in San Francisco, Calif., Meyer Construction Co. rigs airoperated pavement breaker (Thor-Cochise) with heavy square tamping foot.
- 6 PORTABLE ELECTRIC GENERATOR proves useful source of light and power for operating saws, augers and other tools on emergency repair of flood-damaged bridges by crews of Pennsylvania Railroad which used four of these Homelite units on a recent rush job. Generators operated floodlights for night work in addition to supplying power to electric tools.





GROWING UP AHEAD OF MAHONING DAM (below), 6-ft.-diameter concrete pedestals, which become integral parts of structure, expedite concrete placement by Dravo Corp., contractor for U. S. Engineers, on Mahoning Creek flood-control unit in Allegheny River watershed above Pittsburgh, Pa., facilitating completion of dam 993 ft. long and 160 ft. high in two construction seasons instead of three allowed by contract. Using steel forms, Dravo organization easily adds successive lifts to concrete columns as dam rises, maintaining low height of bridge at all times to enable revolving cranes to handle concrete on short lines, according to C. B. Jansen, manager, General Construction Division. Adoption of massive concrete columns eliminates delays incident to design and fabrication of steel towers and bents and dispenses with need for lateral bracing.





WRINKLE BENDING, with aid of Linde oxyacetylene torch, offers fast, economical method of obtaining directional changes in overland pipe lines in rough terrain. Narrow bands extending two-thirds way around pipe on inside of bend are heated to bright red color. Pressure applied to end of pipe then causes heated area to "wrinkle," producing curve in line. Applicable to pipe from 1 to 22 in. in diameter.

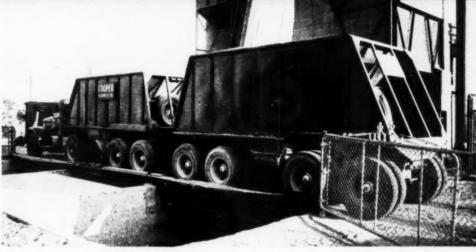
They Did It

CONSTRUCTION DETAILS

For Superintendents and Foremen

PASSING OF MUCK CARS (below) within narrow limits at Hollywood tunnel under construction for Metropolitan Water District of California is accomplished by use of short section of track, at left, carrying car, which can be rolled on or off main line. Tunnel being built by J. F. Shea Co. (Wallace Young, superintendent) as part of distribution system will have inside concrete-lined diameter of 6 ft. and length of 3,730 ft.





TRAILER TRAIN OF 27-CU.YD. CAPACITY delivers sand and gravel to central batching plant of Cooper Supply Co. of Detroit, Mich., where fleet of concrete truck-mixers is loaded for delivery to jobs. Haulage units are two Fruehauf trailers, in tandem, 12-cu.yd. semi-trailer in front and 15-cu.yd., eight-wheel rear trailer. Aggregate is dumped into pit and elevated by conveyors to overhead bins. Trailers of bottom-dump type are hand-operated, equipped with air brakes and mounted on twenty-four 9.00x20-in. pneumatic tires. Large-capacity trailer train is hauled by White tractor.



TRIAL HOUSES in group of 50 built at Norfolk, Va. Naval Operating Base by Byrne Organization, Dallas, Tex., under subcontract with Virginia Engineering Co., Newport News, Va., are five-room dwellings costing about \$2,000 each, utilizing pre-assembled Stran-Steel frame with exterior wall covering of fiber board, chicken wire and sprayed Gunite and interior surfacing of large Upson insulating boards precut to exact wall and ceiling dimensions. Plumbing for roughing-in is pre-assembled with sweat fittings and installed complete in one operation. Sixteen men complete steelwork for each house in 60 min. Under direct contract with Navy Department, Byrne Organization now is building housing project of 1,042 dwelling units employing similar design near Norfolk Naval Base.



FUNNEL-TYPE BUCKET is used by crew of Pacific Constructors, Inc., to pour concrete in close quarters at Shasta dam, U. S. Bureau of Reclamation project in California, Lowered from overhead cablewdy, bucket dumps load over steel bars which reinforce parts of dam where passageways are located. Circular form (at lower left) in for access shalt to horizontal galleries in dam.





FOR TIGHTENING EYEBARS on steel railway bridge large turnbuckle (left) is installed by Hallen Welding Service, Inc., of Long Island City, N. Y., with aid of Lincoln arc-welding equipment. After eyebar has been cut and proper stress has been applied by turnbuckle, splice plate is welded across cut and turnbuckle removed. In view at right are shown smaller turnbuckles welded to eyebars prior to cutting and tightening.



STEEL TOE GUARDS are used as safety measure to protect feet of worker operating pneumatic paving breaker for Southern California Gas Co., of Los Angeles, Safety chains also are standard equipment on gad holders and compressed air hose connections.

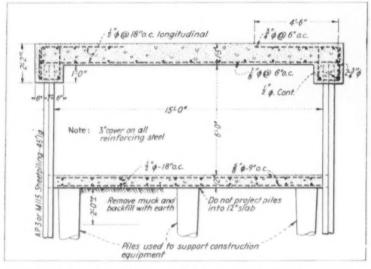
DETACHABLE DROP-BOTTOM BUCKETS (below) of 3-cu.yd. capacity are filled at quarry while truck unit, equipped with special boom with lifting capacity of 4½ tons hauls loaded unit away, thus avoiding idle time for truck. Note empty buckets being filled at quarry face. Outfit known as Dempster-Dumpster backs up to loaded bucket and raises it into carrying position, all operations being controlled by truck driver from his seat in cab. Bucket may be dumped automatically or set on ground without discharging contents. Note, (in close-up view) general purpose auxiliary winch mounted alongside





Full Speed Ahead ON NAVAL AIR STATION PROJECT



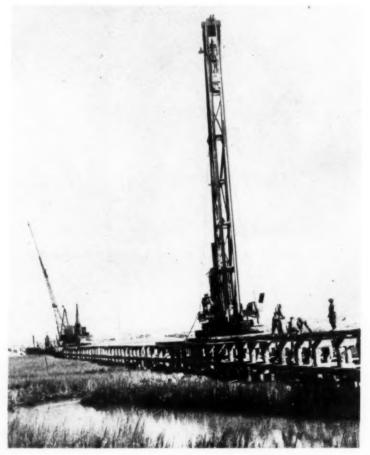


FOR SPEED AND ECONOMY in construction of culvert through marsh land where arch-web steel sheetpiling is required to hold trench banks, design incorporates steel piles as culvert sidewalls. Varying estimates up to 30 years or more for life of sheetpiles in marsh water are offered by engineers experienced in this kind of work.



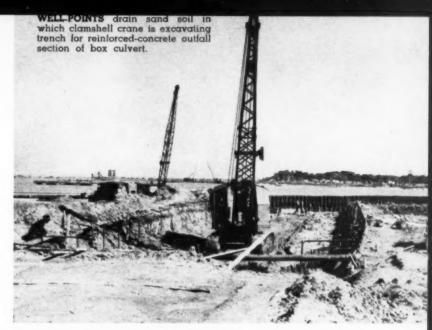


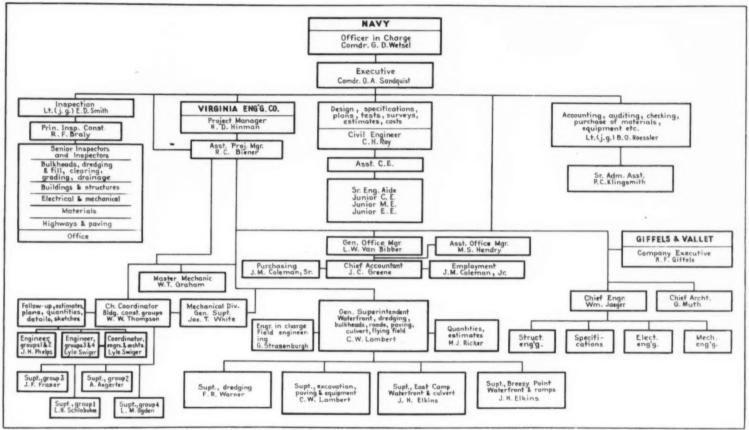
ADVANCING INTO MARSH over construction trestle from dry land in foreground, truck crane drives sheetpiles with 3,000-lb. double-acting hammer receiving steam through pipe and hose from skid boiler plant on dry land.



SKID PILEDRIVER punches down timber sticks for pile trestle on which revolving steam crane (in background) operates to set and drive sheetpile walls for culveit in marsh.

ASSIGNED 15 MONTHS in which to complete a \$17,000,000 naval air station involving huge quantities of dredged fill, grading, paving and structures, the Virginia Engineering Co., contractor, Newport News, Va., and the engineers in charge for the Bureau of Yards and Docks of the Navy Department are using every resource of organization and equipment to beat the deadline by a sizeable margin and to turn over to the Navy's air arm the expanded facilities of the Norfolk, Va. air station, complete with flying field, hangars, warehouses, shops and living quarters months in advance of the contract date. Two hydraulic dredges carrying 27- and 16-in. pumps, ten 15-yd. tractor-scraper outfits, a dozen piledrivers, fifteen derricks and cranes, two 34E paving mixers, from 13 to 30 truckmixers (depending on daily needs), more than 60 trucks, and a full complement of tractor bulldozers, pusher-tractors, motor graders, derrick boats, tugboats, hoists, towers, paving machines, power saws, power drills, concrete batch plants, building mixers, well-points, flood-

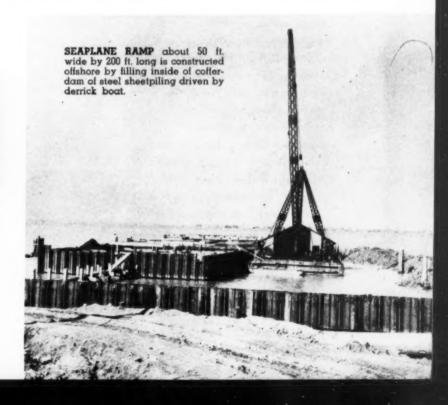




ORGANIZATION directing construction of \$17,000,000 naval air station project comprises officers and engineers of Bureau of Yards and Docks, in charge for Navy Department, officials of Virginia Engineering Co., general contractor, and staff of Giffels & Vallet, contractors for architectural and engineering service. Lines of authority proceeding from officer in charge through project manager and assistant project manager provide required multiple control without confusion of responsibility. Assistant project manager is particularly in charge of building construction.



REINFORCED-CONCRETE CULVERT on timber foundation piles is completed in trench predrained by well-points at rate of 1,500 ft. in 4 weeks. Steel frames of landplane hangars are going up in right background.



*TRU-TRACTION the ability to steer both tracks all ways

(Technical Definition—controlled differential steering) an exclusive Cletrac Feature. _ at all times.

TWO SPEEDS REVERSE

Cletracs speed up every operation in dirt moving, bulldozing, loading or shoveling. Their multiple speeds forward and their 2 speeds reverse enable you to shuttle back and forth faster. Cletracs give more production time for push or pull and have less lost time in empty back-up or haul-back.

down-hill and round-about-ONLY CLETRACS HAVE IT



WOULDN'T it be wonderful if all going were straight? But it's not.

Wouldn't it be wonderful if all going were on the level? But it's not.

Wouldn't it be wonderful if all going were easy? But it's not. So, whether it's up hill — down hill — or round-about — your operators need Tru-Traction all the time every day. Watch them and see. Ask them — they'll tell you.

and see. Ask them — they'll tell you.

Then, it's just plain "horse sense" to choose a tractor that gives positive power on both tracks at all times—power to make a full turn with a full load—power to spot loads exactly where you want them.

Your Cletrac Distributor will gladly demonstrate Tru-Traction on your job to prove Tru-Traction value to you.

THE CLEVELAND TRACTOR CO.

CLEVELAND, OHIO

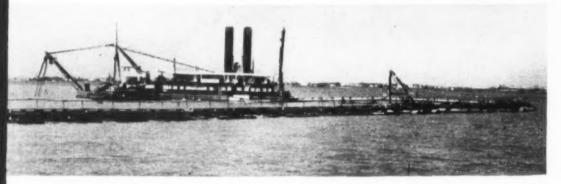
CLETRACS HAVE

- Power on both tracks at all times.
- 2 Higher protected clearance.
- Triple sealing against mud and grit.
- 4 Easier service and quicker adjustments.
- Electric starting for diesel and gasoline engines.

CLETRAC CRAWLER TRACTORS 14 TO 96 HORSEPOWER GASOLINE OR DIESEL



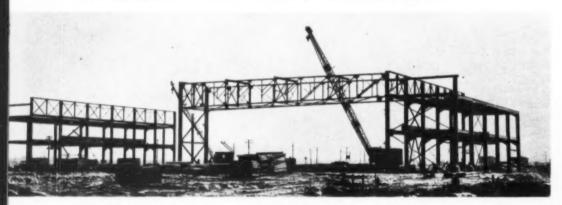
WATERFRONT BULKHEAD consists of outer wall of interlocking arch-web steel sheetpiles 40 to 45 ft. long, weighing 32 lb. per square foot, and inner wall of 12-ft. piles at 27 lb. per square foot. Front and rear walls are tied together by turnbuckle tierods, $2\frac{1}{2}$ -in. upset threads 60 ft. long, at 12-ft. centers. Wales through which tierods pass are made up of two 12-in, 35-lb. steel channels.



27-IN. DREDGE working 24 hr. a day pumps hydraulic fill ashore through pontoon pipe line at rate of about 1,000,000 cu.yd. per month.



TRUSS FRAME for seaplane hangar spans two clear openings. At right is frame for lean-to shop wing of hangar. Seaplane hangar has 86 footings requiring foundations ranging from four composite piles under exterior wall columns to 32 piles under interior central column.



LANDPLANE HANGAR incloses two clear bays. Erection of steel frame requires more than 15,500 field rivets.





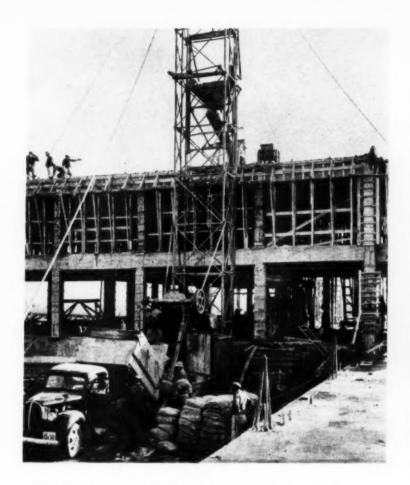
TURNBUCKLE TIEROD 60 ft, long is lowered into position in excavated trench between front and rear bulkhead walls.

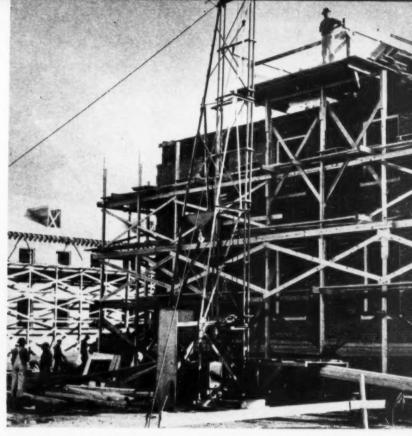
lights and a long list of miscellaneous equipment are kept busy 24 hr. a day, 7 days a week, implementing three shifts totaling 4,000 men in their effort to drive the project through to completion on a high-speed schedule that demands the utmost in coordination, skill and determination.

To fill in the low spots in 1,100 acres added to the existing air station, the two dredges are pumping in 8,000,000 cu.yd. at a rate of 1,300,000 yd. per month; the fill will be up to grade to permit completion of paving this spring. The tractor-scraper fleet of twelve units, operating in squads of three, with a pusher-tractor assisting each squad in the loading pit, has been moving 1,000,-000 cu.yd. of dry fill on average hauls of about 1,000 ft. in volumes up to 27,-000 cu.yd. per 24-hr. day, A 34E dualdrum paver placed reinforced-concrete runway pavement at an average rate of 4,000 sq.yd. per day during the daylight hours last fall, before production was increased by the addition of a 34E single-drum machine to speed completion of the 700,000 sq.yd. of pavement in the project, as reported in an article last month. Steel sheetpile bulkhead in two locations requiring an aggregate of 6,500 lineal ft. has been going in at a rate of 150 ft. per week in each place.



CORRUGATED METAL SHELL for concrete top section of composite pile is slipped over trimmed butt of timber lower section.





COMBINATION PAVING MIXER (left) and tower hoist receive dry batches delivered by trucks to skip and raise mixed concrete to floor hopper on upper story of barracks building.

TUBULAR - FRAME CANTILEVER PLATFORM HOISTS raise brick, tile and other materials to upper floors of barracks building. Note ramp for pushing wheelbarrows and carts up on to hoist platform.

Included in the work, in both the old and new areas, are 41 permanent buildings and 25 temporary barracks and mess halls. Permanent structures such as landplane and seaplane hangars, a 1,000-man barracks building and a fivestory warehouse have steel or reinforced-concrete frames and masonry closure walls. Temporary two-story barracks and one-story mess halls are woodframe units (unprotected by termite shields on their concrete foundation posts) with drop siding and roll roofing over wood sheathing. Permanent buildings rest on thousands of piles, mostly composite, with untreated timber below low water level and concrete above. The five-story warehouse, 600x120 ft., of reinforced-concrete flat-slab construction, was designed to rest on 3,600 steptapered concrete piles, although provision was made to change to pipe steptapered if driving length required. Each of two seaplane hangars required more than 550 composite piles under 86 footings, and each of three landplane hangars called for a smaller number under 69

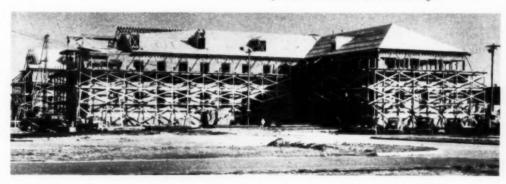


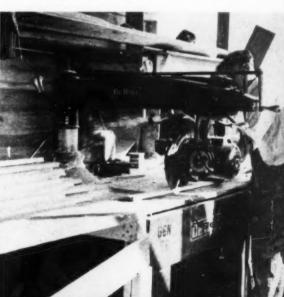
TRACTOR-DRAWN 15-YD. SCRAPERS are loaded with aid of pusher tractors in borrow pit. Allis-Chalmers 108-hp. high-speed two-cycle diesels (above) equipped with pusher plates to fill Gar Wood cable-control scraper. Caterpillar 96-hp. four-cycle diesels (below) load Le Tourneau earthmover; note cable-controlled pusher attachment on rear tractor.

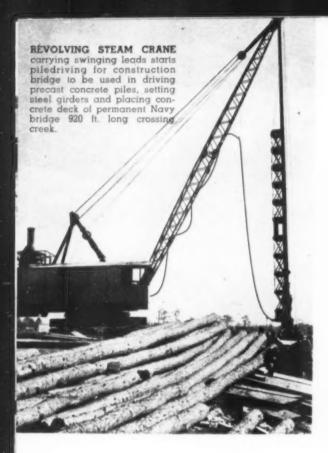


PERMANENT BARRACKS BUILDING (below) for 1,000 men has reinforced-concrete frame and floors, brick and tile closure walls, and slate roof on wood sheathing and roofing felt. Half of building is being inclosed; concrete slab floor is being placed on second half at far right.

UNIVERSAL-ADJUSTMENT SAW (below) powered by 5-hp, motor cuts form lumber for barracks building.







footings. To drive piles under these and other permanent buildings, a subcontractor, the Raymond Concrete Pile Co., put five skid rigs on the job. The general contractor is driving all sheetpiles and all precast concrete and creosoted timber piles for bridges.

Organization

Prompt decisions are essential on the innumerable questions which arise in building a complex project of this size if a rush schedule is to be maintained, and the organization of the job by the Navy Department and the contractor is designed with this end in view. The officer in charge, Commander G. D. Wetsel (CEC) U.S.N., appointed by the Bureau of Yards and Docks of the Navy Department, is authorized to handle practically all questions and details without recourse to headquarters. As shown by an accompanying chart, the Navy and contractor personnel is organized under the officer in charge in a system which fixes responsibility and assures adequate control without undue concentrations of authority that might cause delays. Assembled in one office building, the executives of all branches are immediately accessible for consultation, and the entire organization works with harmony and full cooperation to achieve the common objective of maximum daily progress leading to early completion. General meetings twice a week in the office of the officer in charge bring together the engineers, managers and superintendents representing all types of construction to iron out difficulties and plan working schedules.

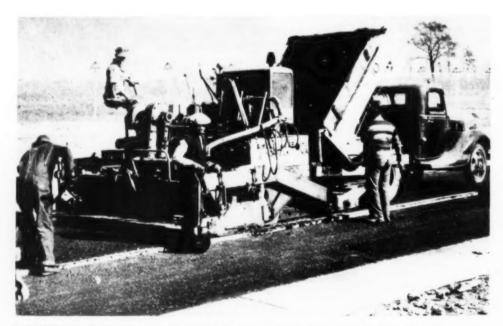
In the general contractor's organization, the project manager, H. D. Hinman, is more directly in charge of heavy construction, consisting of the development of the new area, landing fields, (Continued on page 107)



WOVEN WIRE FENCE almost 5 mi, in length protecting Navy property on land side is spliced to



5-YD. TRUCK MIXERS on tandem-axle chassis deliver bulk of concrete for foundations, heavy structures and paving of this public highway through naval reservation. Smaller 3-yd. mixers on fourwheel trucks are used in some tight locations and on soft ground.



WIDENED TO 30 FT. (above and below) with new concrete lane and shoulder, old 18-ft. concrete section of public highway through naval reservation is paved with two courses of bituminous concrete laid in single lanes without interrupting traffic.





CHARLES F. PALMER is newly appointed coordinator of defense housing for National Defense Advisory Commission at Washington, D. C. He heads Division of Defense Housing established by executive order and is responsible only to President Mr. Palmer is president of Palmer, Inc., of Atlanta, Ga., and served as chairman of Atlanta Housing Authority.





JOHN S. MACDONALD, chief engineer of Walsh Construction Co., has been honored by The Moles, an organization of men engaged in tunneling and heavy construction in greater New York area. At banquet Feb. 5, Mr. Macdonald was recipient of an award for outstanding achievement in construction "in recognition of his enterprise, courage, and resourcefulness in construction, notably in building Queens-Midtown tunnel."



GEORGE E. SPARGO, executive officer of New York City's Department of Parks, under Commissioner Robert Moses, was elected president of Municipal Engineers of City of New York at that organization's recent annual meeting.



Present and Accounted For

A PAGE OF PERSONALITIES

GEORGE J. ATWELL (left), well-known New York contractor specializing in foundation and substructure work, has been named president of Thompson-Starrett Co., Inc., building contractors of New York City.

HON. ROBERT A. HURLEY (right), former contractor and member of firm of Leverty & Hurley of Bridgeport, Conn., is now serving as Governor of State of Connecticut as result of last November's election.





HOLING THROUGH of New York City's Delaware River aqueduct tunnel between Shafts 3 and 4 marks completion of 5.25-mi, section of 13½-ft.-diameter bore for New York City Board of Water Supply by crew of Samuel R. Rosoff, Ltd., contractor. In photo are: (Standing, left to right) MAX F. FREUND, division engineer, B.W.S.; WALTER DUNHAM, superintendent, Shaft 3; CLAUDE S. YOUNG, safety engineer; PHILLIP S. MILLER, resident engineer, B.W.S.; FRED W. STIEFEL, job manager. (Seated, left to right) GEORGE UNDERWOOD, superintendent for Walsh Construction Co. at Shaft 4; HUGH CRONIN, shaft engineer, Shaft 3; JOHN G. MERGOTT, section engineer, B.W.S.



LAST BLAST is fired in Hollywood tunnel of Metropolitan Water District distribution system in California. Present at holing through are: (Left to right) C. MONAGHAN, inspector; SAM THORNE representing J. F. Shea Co., Inc., contractor; and R. B. DIEMER, distribution engineer for Metropolitan Water District of Southern California. This is 42nd tunnel to be holed through on Colorado River aqueduct project.

SALAMANDERS AND TARPAULINS PROTECT Winter Concrete





GRADE SEPARATION BRIDGE to carry intersecting highway over divided roadways of Hutchinson River Parkway Extension has twin elliptical arch spans of reinforced concrete faced with ring stone of granite dimension masonry from Deer Island, Me, Ring stone serves as outside form for concrete. Remaining stone masonry, cut to dimensions on job, is Milford, Conn. granite. Timber bents on mud sills support arch forms for twin spans. Double arches are concreted one-half at a time, from ring stone to center-line construction joint.



WITH HALF OF CONCRETE PLACED on two arches, temporary fabric inclosures heated by salamanders keep concrete warm for total of 6 days. Reinforcing steel is already in place for second half of double arches. COKE-BURNING SALAMANDERS (right) inside inclosures maintain temperature of 50 to 65 deg. F. for total of 6 days during and following concrete placement.

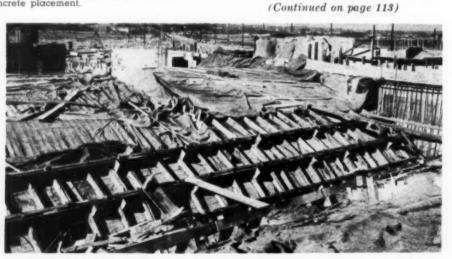
SUPERVISION AND INSPECTION are ably accounted for by: (left to right) J. SCHMIDT, time-keeper; AL E. DENNY, inspector; A. W. BÅNKO, treasurer of Petracca & Banko, contractors; I. FINKELSTEIN, engineer in charge for State Department of Public Works; and R. Å. DENNIS, inspector for the state.

TO RUSH COMPLETION of the Hutchinson River Parkway Extension, 3.9 mi. in length, connecting the Whitestone Bridge across the East River with the Westchester County parkway system, ten contractors are busy building highway grade and bridges, preparatory to spring paving, for the Triborough Bridge Authority, New York City, under direction of the New York State Department of Public Works. Concrete has been placed during cold weather in nine grade separation bridges and in the substructure of one steel lift bridge crossing the Hutchinson River (Eastchester Creek). Two twin-span elliptical arch bridges to carry intersecting highways over the divided roadways of the parkway on the contract of Petracca & Banko, Winfield, Queens, New York City, are representative of grade separation structures on the project. Accompanying photographs show concrete protection methods employed by Petracca & Banko on the two double-arch bridges. The methods may be accepted as typical of those employed by most of the contractors building grade separation structures on the project.

Coke-burning salamanders inside tem-



CONSTRUCTION is directed by: (left to right) CHARLES M. LEAHY, superintendent and chief engineer for Petracca & Banko; J. RANDELL, carpenter foreman; and KENNETH WILLARD, engineer in charge of layout.



TARPAULINS OVER SALT HAY protect concrete on first half of arch, at right; while burlap mats, at left, cover arch steel on second half to keep snow from falling into forms.



TWO MEN easily handle 130-lb. units of sectional steel grating for runway mats. Note slip-sleeve collars on spear-head splice bars along edges of unit.

STACKED ON BARGE. sectional panels show alternate end designs, one end carrying slip-sleeve collars and other end spearhead splice bars for coupling transverse joints.

of a patented portable steel grating for airfield runways, the Irving Subway Grating Co. recently loaded on three barges at its Long Island City, N. Y. plant, 450,000 sq.ft. of cold-riveted steel gratings in two-man units about 2x12 ft. in area, weighing 130 lb. each, for delivery under a \$204,000 contract to the Corps of Engineers, U. S. Army. The sections are designed with slipsleeve collars and spear-head splice bars along the edges to facilitate quick assembly and dismantling on the ground with simple hand tools. It is estimated that under the most favorable conditions

PREPARATORY TO A FULL-SCALE TEST

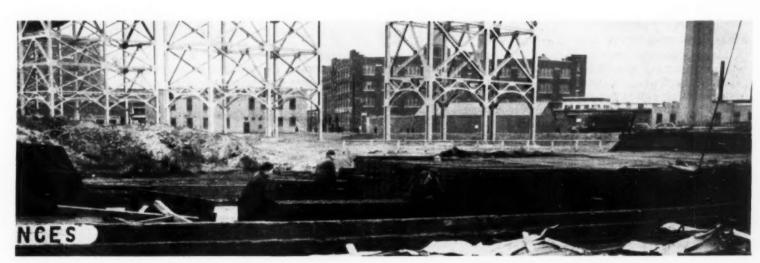
3,000-ft. runway in 36 hr.

During the summer and early fall the Corps of Engineers, U. S. Army, made intensive tests of samples of many types of grating at Fort Belvoir, Va. Promis-

200 experienced men might lay a 150x

Portable
Steel Grating
FOR TEMPORARY
AIRFIELD
RUNWAYS

ing types were taken to Langley Field, Va., for further testing. As a result of these preliminary tests, the grating with the highest composite rating for all features desired has been selected for a full-scale runway experiment. Among these features are portability, simplicity, flexibility and bridging strength sufficient to conform to uneven ground without rupture of the mat or creation of sharp obstacles to plane wheels, and a low coefficient of friction under pneumatic rubber tires. The army wants a light-weight mat having these characteristics for laying on soft or uneven ground which the Air Corps may wish to use as a temporary airfield. To fill a similar need and to bridge bomb craters in existing airfields, the British, French and Germans have developed different types of mats employing portable steel grating.



150,000 SQ. FT. of portable steel grating, in units measuring about 2x12 ft. each, is loaded on to barge to supply about one-third of material required for full-scale test of temporary runway mat by U. S. Engineers.



CANVAS "TENT" measuring 75 ft. wide and 125 ft. long, was erected, before razing of old building, on framework supported 64 ft. above sidewalk level on wood columns.



POURING OF CONCRETE for new three-story building was carried on continuously under canvas tent, thus avoiding delays due to rainy weather.

Canvas "Tent"

Foils Weather on

Building Demolition and

Replacement Job



PRIOR TO DEMOLITION old 2-story brick building, erected in 1880's, was used by Hamilton National Bank for general working space and safety deposit vaults.

A CANVAS "TENT" 75 ft. wide and 125 ft. long, supported 64 ft. above sidewalk level by a framework carried by wood columns, enabled the Mark K. Wilson Co., builders, of Chattanooga, Tenn., to eliminate delays due to bad weather in demolishing an old two-story brick building and replacing it with a modern three-story reinforced concrete structure for the Hamilton National Bank of Chattanooga. Located at the rear of the bank's 15-story main office building, the razing and rebuilding project, including alterations and redecorating in the main bank building, cost approximately \$200,000. Speed was an important consideration on this job because, during the construction period, it was necessary to move the departments from the old brick building into the banking quarters of the adjacent office building, thus reducing the bank lobby and work space by half. The bank officials, naturally, desired the addition completed as rapidly as

The supporting framework for the protective canvas cover over the old building was erected, before any demolition work was begun, by making holes for the tent columns through the floors and roof of the old building. The columns then were set, the top framed and the canvas stretched. When the tent was completed, wrecking operations were started on the old brick building and it was razed in $3\frac{1}{2}$ days.

The old building had no basement, so the next step was the removal of 3,043 cu.yd. of earth and the underpinning of the walls of an adjacent theater. Here the tent kept the basement dry during several rains and permitted uninterrupted excavation operations. Keeping the site dry also prevented costly cave-ins of earth banks when shovel excavation was carried out to curb lines and to adjacent buildings in alternate sections. After the basement was excavated, foundations were poured and concrete work was pushed along until on the 55th working day the concrete crew of the Wilson organization poured the roof slab. The terra cotta face and other masonry work then was completed and the Hamilton National Bank was moved into its new addition, thus relieving the temporary crowding in the adjacent office building.

How to cut rope costs



WIRE ROPE Through years of planned research and development, we have continually improved the endurance of Roebling "Blue Center" Wire Rope. Today, as a result, "Blue Center"-Roebling's highest

There are other important reasons for the long life and economy of "Blue Center". For example-Roebling's control of every manufacturing process from raw material to final inspection, and exceptional testing facilities.

achievement in wire rope manufacture -enables you to keep your wire rope replacements at an all-time "low".

Contractors who keep accurate records report that Roebling"Blue Center" gives them lowest rope replacement cost. Therefore, we say with assurance-put Roebling "Blue Center" to the severest test-on any of your rope-rigged equipment. We are confident of the results!

JOHN A. ROEBLING'S SONS COMPANY

Trenton, N.J. Branches in Principal Cities

Export Division: 19 Rector Street New York, N.Y., U.S A

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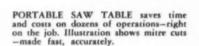
CLOSE CONTROL OF WIRE ROPE QUALITY

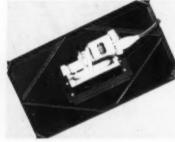
When it comes to making Roebling "Blue Center"-a wire rope of exceptionally great strength and stamina — ordinar production methods won't do. Painstaking care and skill of the highest order must be exercised.

Typical of this care is the close control of quality in making Roebling "Blue Center" finished product.

JOHN A. ROEBLING'S SONS COMPANY







View of underside of PORTABLE SAW TABLE, showing demountable legs and mounting of Black & Decker Saw which permits all angle and depth adjustments.

POWERFUL Black & Decker SAWS for PORTABLE SAW TABLES

BLACK & DECKER meets every saw need with four fast, efficient Portable Electric Saws. No. 85 Quick Saw is close-coupled for easy, one-hand operation. Vertical depth of cut, 25/8". No. 95 Saw, a larger unit, has 31/8" depth of cut. No. 75 Saw cuts to 23/8"—ideal for all popular lumber sizes. No. 35 is very light and handy Saw for trim work. All B & D Saws have SAFE telescoping blade guard, adjustments for angle and depth of cut—Universal motors plug in any light socket or portable generator. Phone your jobber to show you Black & Decker Saws or write: The Black & Decker Mfg. Co., 759 Penna. Ave., Towson, Md.



Cutting corrugated asbestos siding with #75 B & D Saw and abrasive disc.



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LEADING DISTRIBUTORS EVERYWHERE SELL



PORTABLE ELECTRIC TOOLS

Page 70 - CONSTRUCTION METHODS - March 1941

CONSTRUCTION EQUIPMENT NEWS

PORTABLE FIRE EXTINGUISHER known as Indian fire pump, consists of 5-gal. brass or Armco Zinco-grip rust-proof tank curved to fit carrier's back and held by shoulder straps. Filled with clear water and operated by bass hand pump, it throws stream 50 ft.



under continuous pressure. Tank has ventilated back in order to keep cold and dampness from affecting operator. Used, according to manufacturer, to provide emergency and some permanent fire protection in camps and on construction projects of all kinds where prompt and efficient fire protection is essential. Racks available for carrying extra tanks on trucks.—D. B. Smith & Co., 418 Utica St., Utica, N. Y.

WATERTIGHT BOLTS for better wood assemblies are designed with splined shank to prevent turning and double-rib water seal beneath head which compresses wood fibres without splintering, draws down flush with wood surfaces and eliminates need



for counter-boring. In addition to head-end seal, an additional seal against moisture is provided by tapered bolt shank with tapered splines, between which wood fibres pack tightly. Slightly convex head sets flush with wood surface when bolt is tightened. Bolt sizes are standard as to threaded portion and are available in diameters from ½ to ¾ in. and lengths from ¾ to 7½ in.—Lamson & Sessions Co., 1971 West 85th St., Cleveland Ohio.

S.O. PRODUCTS AND SERVICE HELPED US "MAKE THE GRADE" ON SCHEDULE

Henry A. Raemisch Company Dane, Wisconsin

August 20, 1940

Mr. R. F. Baity, Manager Standard Oil Company Davenport, Iowa

We wish to take this opportunity to acknowledge our appreciation of the fine service rendered by your organization in taking care of our requirements on a grading job near Cedar Falls, Iowa. Dear Six:

operate eight Diesel and one Sem-Diesel Tractors, two gasoline rollers of the miscelaneous equipment. It is necessary when operating sixteen the day that all equipment function efficiently in order to complete the day that all equipment function officers of dirt on schedule.

On moving into lows for the first time to start this job, your salesman, into lows for the first time to start this job, your salesman, which was a start to said informed us of the products and service large in a position to supply. "e became interested and decided to give were in a position to supply. "e became interested and decided to the were in a position to supply. "e became interested and decided to give were in a position to supply. "e became interested and decided to give were in a position to supply." E recommendations of hells and that we may be supplied to the same of the sam

In closing, we wish to thank your organization, whose service, together with the furnishing of the proper products, we feel, has been a prime factor in the furnishing of the proper products, we feel, has been a prime factor in the furnishing of the schedule of this job.

H. A. Baemisch Company

• Would the same engineering service and the same products mentioned in this letter save money for you? There's only one way to find out. Let one of these Engineers work with your maintenance crew. See what he has to suggest. Just call the local Standard Oil (Indiana) office or write 910 S. Michigan Avenue, Chicago, Illinois. In Nebraska write Standard Oil Company of Nebraska at Omaha.



STANDARD OIL COMPANY (IND

AUTOMOTIVE ENGINEERING SERVICE

Meed POWER 3

CHOOSE FROM THE WORLD'S MOST COMPLETE LINE • 250 WATTS to 50 KW.

Whatever your electrical requirements may be — from a small portable plant to operate half a dozen lamps to current and power enough for a whole construction camp — you'll find exactly the right size and type in the Universal line. There are

portable, stationary, and marine types, to operate on gasoline, natural or artificial gas, fuel oil, kerosene or Diesel oil. They're simple to operate — dependable; widely used on construction jobs, in the oil fields, mines, etc.

Universal "MATCHED UNIT" ELECTRIC PLANTS

Universal light plants are not merety "assembled" with an engine hooked up to a generator. In each Universal, the power, plant, generator, cooling system, etc., are perfectly matched to each other, with all reciprocating parts in true balance, to assure the smooth flickerless light for which Universals are so well known. They're economical to own and operate; deliver current often at less than city rates. Many thousands of Universal "Matched Unit" Electric Plants are in the service of the United States covernment on land and see the

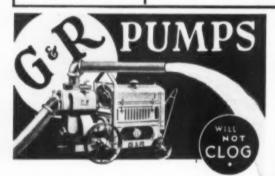
Bulletin 41-E shows many interesting uses and explains various types of control available. Universal engineers will glodly analyze your problem and recommend the plant best suited.

less than city rates. Many thousands of Universal "Matched Unit" Electric Plants are in the service of the United States government on land and sea.

UNIVERSAL MOTOR COMPANY

346 Universal Drive

R COMPANY
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cylinder, air cooled modi ige from 250-1800 watts.

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The Most DEPENDABLE Pump For The Least Money

Claims of fastest priming, highest suction lift, more gallons per minute, etc., do not pump water. On the job, the pump must do its own talking, and with dirty water, many a pump is inclined to stutter—and stop.

Let G & R Pumps tell you their own story on any job. They will deliver as much, and usually more, water under any condition, than any other pump. We will ship you one and let you be the judge.

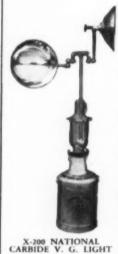
Remember this about G & R Pumps— THEY WILL NOT CLOG—THEY ASK NO TIME OUT. Play safe! That is why more contractors are standardizing on G & R Pumps than on any other make.

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NATIONAL CARBIDE LIGHTS

are proving their outstanding superiority and value by providing Powerful "Portable Daylight" in all emergencies.

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PROPERTY PROTECTION RUSH CONSTRUCTION EMERGENCY REPAIR

You need one or more on hand, ready for regular duty or instant use.

DEPENDABLE . ECONOMICAL . SAFE

X-200 (as illustrated) with two 8,000 candlepower directional controlled reflectors, is ideal for guard duty on all construction work; for all purposes where an abundance of light is required.

Other Lights available. Write today for circulars showing prices and complete line.

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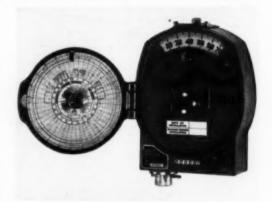
LINCOLN BLDG., NEW YORK, N. Y.

ONE-MAN. ONE-MOTOR CRANE mounted on pneumatic-tired truck frame is named "Mobile-Crane" because of its mobility. Requires no tracks or special preparation for moving, but will go wherever any industrial truck can go. Has four speeds forward and backward and will lift and carry loads up to 15 tons at speeds up to 5 m.p.h. and swing in full circle. Booms of 45, 50 and 55 ft. are standard, but longer booms can be furnished for special needs. May be equipped to load and unload any kind of material with hook sling, magnet or clam-



shell bucket. Screw jacks relieve tires when making heavy lifts. Hydraulic jacks are available. Outriggers with screw jacks give machine greater stability when working over side. Also two jacks over front axle keep upper body on an even keel at all times. Steering accomplished by hydraulic control, and machine may be turned in 50-ft. radius. Front and rear wheels are equipped with air brakes of internal expanding type, said to afford maximum safety when traveling on highway. Tandem rear wheel assembly mounted in large bearing bolted to frame and has knee-action effect when traveling over obstacles. This keeps upper body level at all times and relieves frame of twisting strains.—The Osgood Co., Marion, Ohio.

CHECK ON TRUCK OPERATION is made possible by installation of Sangamo tachograph, recording instrument providing automatic, graphic log of time, speed and distance. Every movement of truck—when engine is started, when truck is moving, how fast it travels, when it stops—is recorded to provide accurate information on truck's daily performance.



Installed on instrument panel of motor vehicle and connected to speedometer cable, tachograph comprises clock, speedometer, odometer, speed change indicator and signal light, all inclosed in bakelite case with hinged door. Device operates by recording on circular chart that is revolved by clock and held against two inscribing stylii which mark mileage and speed. Third stylus indicates whether motor is stopped or running. Use of this instrument to analyze driving performance is claimed to result in savings in gas, oil, tires and repair, and to promote driving safety. In case of accident, tachograph record may supply useful evidence on speed and time.—Sangamo Electric Co., Springfield, III.

Built airports for DEFENSE the naw COST WAY

The smooth, accurate, finished work needed for airport construction is easy to get with a Bucyrus-Erie scraper. Two-line operation gives you positive independent control of the cutting edge so that you can hold an accurate grade in both cutting and spreading.

This scraper beats them all for finishing. With bowl held in raised position, it can be used as a substitute for a grader. Operator has full visibility so that he can see what he's doing and can hold the blade exactly where he wants it.

You'll like the smooth, finished work this scraper does. And you'll make money on the big output it gives you with its fast cycles.



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Built for speed, this scraper digs fast, hauls fast, dumps fast, and turns fast



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BUCYRUS-ERIE BULLGRADER

It holds an accur ate grade and ha a blade that car be angled for side casting. Use it to clearing and fo moving stones, etc out of way o scraper.



LOW COST MAINTENANCE Simplest scraper on the market, has only 5 main parts. That means less trouble, less time out, less main-

BUCTICS - ETTE



eral contractors is speeding construction in keeping with to-

and you may not need a bigger crane

The big $\frac{3}{4}$ yard machine with 10 ton crane rating and high line speeds, illustrated above, is typical of the field-proved BAY CITY design from sturdy crawlers to boom point. Sporting heavy duty construction throughout, yet eliminating unnecessary deadweight, the strong, well balanced design offers you BIG MACHINE VALUE. That is why more machine owners are switching to the fast, powerful, easy operating BAY CITY. Why not write for your copy of 32 page illustrated Catalog H-2, which contains specifications, shovel working ranges and crane ratings of the complete line from % to 11/2 yard capacity.

BAY CITY SHOVELS, Inc., Bay City, Mich.

shie weight of 25 tens, including long pl

Snappy clutch response through tion—swing speed of 5 RPM.

Hoist pull and speed of 12,500 lbs. at 156' per min. (single line).

Fast, easy travel and steering, without stopping to set brakes or shift clutches. 14 MPH low—1 14 MPH high.

Extra power with big & cyl. gasolino engi 78 HP at 1200 RPM. Diesel or electric po

ng of 10 tons at 12 feet with 35'

COMPLETE DETAILS on this fast, powerful, easy securating crone are in Catalog 45C-C. Write



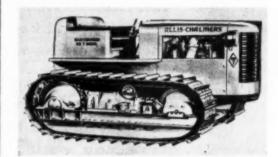
CRANES . DRAGLINES . TRENCH-HOES

LIGHT-DUTY TRUCK 11/2-ton capacity with all steel welded dump body is claimed by its makers to be ideally suited to needs of municipalities, excavating and other contractors. Features: (1) New type of rear wheel "Hi-Tork" brake said to equalize brake shoe pressure, to increase efficiency and to reduce maintenance costs; (2) all steel comfort cab with adjustable seat and back cushions; (3) im-



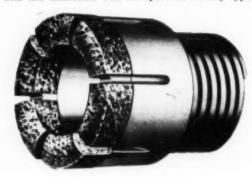
proved steering; (4) standardized cab-to-rear-axle dimensions; (5) full-floating rear axles; (6) roller bearing anti-friction universal joints; (7) improved self-aligning propeller shaft center bearings in long wheelbase chassis; (8) rubber cushioned three-point engine mounting; (9) rubber mounted radiator; (10) sealed beam headlights; (11) mechanical shift starter; (12) oil bath air cleaner; (13) truck-type clutches and transmissions and (14) two-speed rear axles.—International Harvester Co., 180 N. Michigan Ave., Chicago, Ill.

DIESEL POWERED TRACTOR, 54 hp., for use with 5-yd., two-and four-wheel scrapers, 8- to 10-ft. blade graders, sheepsfoot rollers, 7-yd. wagons, bulldozers and angle dozers, features low fuel consumption and smoothness of operation of its full diesel engine. Other outstanding advantages: (1)



touch" bi-metallic clutches and brakes, because of heat conducting quality, ars said to last longer, to require less maintenance and to speed up tractor operation; (2) Positive Seal truck wheels and idlers require lubrication once each 200 hr. of operation; (3) new track release mechanism said to reduce wear on tracks and to prevent unnecessary. reduce wear on tracks and to prevent unnecessary wear on other tractor parts. Choice of forward speeds from 1.84 to 5.82 m.p.h. Reverse, 2.19 m.p.h. Weight, 13,000 lb. in 63-in. tread model; 12,500 lb. in 52-in. tread model. — Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DIAMOND IMPREGNATED CORE-BITS—trade name "Sinta-Set"—are designed to reduce drilling costs, decrease drilling time and eliminate reconditioning and resetting of diamond bits. In new bits entire matrix forming crown is impregnated with industrial fort diamonds. Can be operated on any type



REGULAR INSPECTION SAVES WIRE ROPE DOLLARS

It Pays PLENTY to Inspect Your Wire Rope REGULARLY

Don't wait until a failure occurs before examining your wire ropes. Look them over at regular intervals.

Close examination will not only indicate when it's time to put on a new rope but it will also reveal many things about the way your rope likes its work—whether it is suited to the job.

For instance—wires breaking without showing wear indicate excessive bending—sheave and drums are too small or rope construction is too coarse.

Rope crushing or flattening indicates too much pressure—improper winding—or rope not constructed to withstand the condition.

Whole strands or entire rope breaking soon after installation means overloading... or indicates the need for a stronger or larger diameter rope. INSPECT YOUR ROPES REGULARLY and you will become familiar with the behavior of your wire rope. This will enable you to detect many enemies you can correct to your own satisfaction and savings in Rope Cost.

If your ropes are not adapted to the work they are doing and the reason is not apparent—call in your Macwhyte wire rope representative or consult the manufacturer of your equipment.

REMEMBER — Macwhyte is ready to help you whenever you call. Men at Macwhyte who make "The CORRECT rope for your equipment" and study it on the job, know how to get the most out of a rope. They'll gladly give you the benefit of their experience.



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Manufacturers of rope wire—braided wire rope slings—Monel Metal and Stainless Steel wire rope—aircraft cable, tie-rods, and "Safe-Lock" terminals for aircraft—and wire ropes for all requirements.

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No.7 in a series of informative articles for wire rope users, prepared by the Macwbyte Wire Rope Company. Previous articles in series available on request on your company letterheads.

Are these

common causes for wire rope failure costing you money?



1. Sheaves too small. This rope was forced to travel continuously over sheaves whose diameters were too small. This caused severe bending fatigue. Result—broken wires, ruined rope. (Note: <u>PRE</u> formed rope would have lasted much longer in this case.)

2. Drum abrasion and abuse caused this. The rope was scuffed over and over against previous wraps on a flat-faced drum. Its life ended long before it should have.





3. Kinking eaused this. The dog-leg, or kink, was finally straightened out of this rope... but notice the uneven wear at the point where the kink had been. Beware of dog-legs! They're expensive.

4. Uneven drum winding is a frequent rope-wrecker. This rope was wound unevenly time after time on to a drum. Result—it is crushed and flattened. The service cost of this rope was unnecessarily high. WATCH how the rope winds!





5. Aeids Did This. This rope was attacked by high Sulphur content in the water and crude oil through which the rope operated. A heavily internally lubricated rope will resist the action for a time.

6. Foul Play "killed" this rope. While in operation, this rope met with an accident that mashed and cut many of its wires. Result—a ruined rope, and many a rope dollar wasted that could have been saved.



SPEED & ACCURACY!!! COVER 1,000 SQ. FT. IN 15 MINUTES! with "Whiteman" Cement Floor Finisher



gasoline or electric drive, complete operating contro finger snap switch, V-Belt drive, and adjustable rotat

UNEQUALLED FOR HARDNER & COLOR WORK

GASOLINE or ELECTRIC DRIVE

Your cement finishers can cover twice the area with the "Precision" Cement Floor Finisher — which will travel over 1,000 sq. ft. in as little as 15 minutes. The rotating, adjustable pitch trowels glide over the surface under absolute control of the operator — produce flatter, smoother floors in half the time. "Precision" is the only machine that completely FLOATS and STEEL TROWELS a cement floor.

More Perfect Floors . . .

You will get a far denser, more wear-resistant floor without laitance or voids caused by water or air particles. You can use a low water ratio, for the weight of the machine will compact your aggregate, bringing what little water you have to the surface. The coarse aggregate will be uniformly distributed throughout the entire finish and right up to the wearing surface. You get an absolutely level floor without high or low spots or riffies, due to the action of the rotating steel trowels.

Pays For Itself . . . You finish cement with "Precision" at substantially reduced cost, for this machine finisher eliminates unnecessary coatly overtime. It is real insurance against your floor "getting away from you" when extra finishers are not available.

Now in General Use . .

The "Precision" Cement Floor Finisher has given suc-cessful performance everywhere, being used on work for the Boeing Aircraft Co., Douglas Aircraft Co., Lock-heed Corporation, and greater portion of army and navy jobs.

Write TODAY for the name of your nearest dealer.

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Streamlined...for Greater Comfort!

GOODALL "Toe-Saver" BOOTS



Real comfort, long wear and safety are characteristics that have made "Toe-Savers" the favorite of both buyer and wearer on every kind of job requiring boots. A flat last, cushioned insole, ample ventilation and plenty of toe-room, make "Toe-Savers" extremely easy on the feet. Finest quality materials and exclusive reinforcement features insure utmost economy through longer service. Patented built-in steel toe-cap, and tire-traction cross-ribbed sole, provide an unequalled degree of safety. In other words, GOODALL'S "Balanced-Built" construction gives you

ONGER WEAR IN EVERY PAIR Styles: Short, Three-Quarter, Full Hip, Boot-ees, Sizes: 6-12, incl.

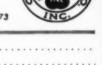
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GOODALL RUBBER CO., Inc. 5 South 36th St., Philadelphia, Pa.

Please send copy of your work-en's BOOT and CLOTHING CATALOG.

Company City and State..... Att. of Title

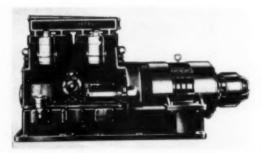
of rotary drilling equipment actuated by steam, air, gas, or electricity with either mechanical or hydraulic feed. Advantages claimed: (1) Do not have draulic feed. Advantages claimed: (1) Do not have to be reprocessed when worn; no resetting of diamonds required; (2) core bits do not have to leave operator's hands until completely worn out; (3) few bits need to be carried in stock; (4) tolerances may be held closer, eliminating unnecessary reaming; (5) eliminates expense of carrying diamond stocks for bits; (6) reduces diamond loss hazard; (7) lower cost diamonds may be used; (8) bits will stand great abuse because of better distribution of diamonds and harder matrix used. — Carboloy Co., Inc., Detroit, Mich.

DIESEL LOCOMOTIVES, 4-, 5- and 6-ton models, are now powered by International UD-6 engines, 4-cylinder, 4-stroke cycle units developing 39 hp. at 1,500 r.p.m. This engine is said to make ideal locomotive power plant because its high torque at slow speeds provides lugging ability of steam engine. Power is applied to all four wheels through four

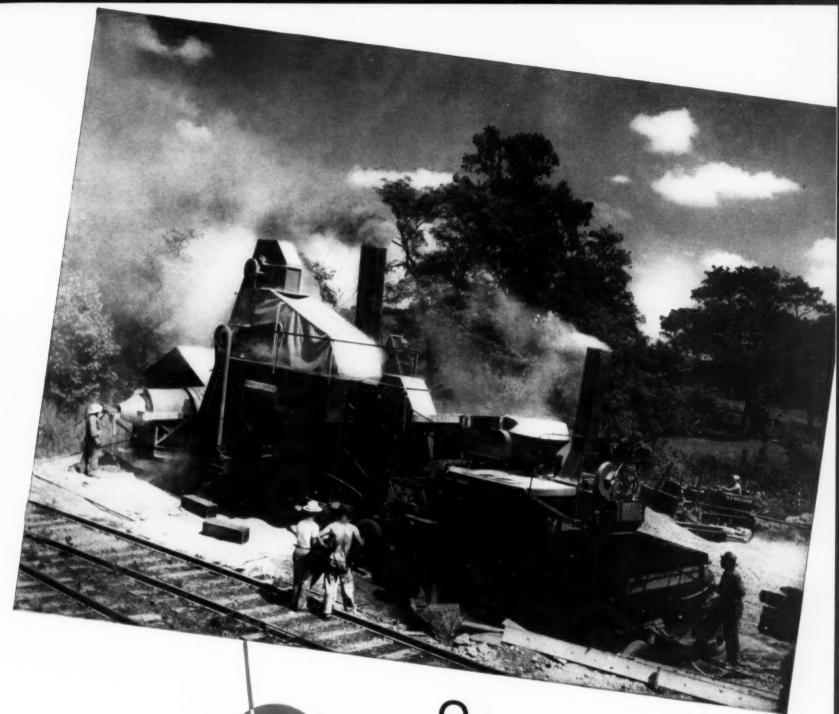


forward and four reverse speeds, latter made forward and four reverse speeds, latter made available by Brookville reverse gear operating in conjunction with heavy-duty, four-speed transmission. Work capacity of locomotive further increased by use of steel tires said to increase traction 25 per cent more than chilled face drive wheels. Other features of locomotive: Dual spring journal suspension which permits high speed over poor track; indestructible steel frame; Timken bearings.—Brookville Locomotive Co., Brookville, Pa.

DIESEL ENGINE. 36-40 hp., 4-cylinder 30-kva. unit, is electrically started and, according to its makers, has many construction features heretofore characteristic of engines 100 hp., or larger. Many parts are interchangeable with 9-hp. single cylinder vertical engine. En bloc construction with replaceable wet-type cylinder liners. Well-balanced drop-forged wet-type cylinder liners. Well-balanced drop-lorged crankshaft with liberal main bearing area. Heavy-duty Babbitt-lined steel shells for main bearings. Spiral gear driven accessory shaft mounted on Tim-ken roller bearings. Heavily stressed parts of alloy steel. Pierce governor assures close governing.



Built-in gear-driven water circulating pump, thermostatic jacket water control and water-cooled exhaust manifold provide ample cooling by radiator, tank, tower or marine pump. Cylinder head contains combustion chamber, intake and exhaust valves and fuel injection nozzle. Silcrome steel valves, valve seat inserts and replaceable valve guides. Pistons long enough to carry four compression rings and one oil ring. Well ventilated crankcase with forced feed lubrication to cam and crankshaft bearings and forced flood lubrication to gears. shaft bearings and forced flood lubrication to gears. Flywheel, clutch, 30-kva. generator or marine gears may be attached to either end of engine so that they may be installed in matched "right" and "left" units.—Witte Engine Works, Kansas City,



Four



Significant Jobs

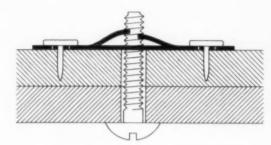
Over 150 Barber-Greene Bituminous throughout the country in 1940.

Out of these hundreds of jobs, four were outstandingly significant. These four continuous mixers were equipped with Barber-Greene Gradation Control Units, and the plants applied to the "high type hot mixes" on four widely separated locations. We engaged a competent private laboratory to follow each job thoroughly, and invited Federal, State, and City Engineers to witness each job in operation, take samples, and make analyses in their own laborators.

The results are startling. See other side.



SPRING TENSION NUTS available for wood screws, stove bolts, machine screws, sheet metal screws or rivets, are said to hold wood assemblies together so firmly that all possibility of loosening is eliminated. May be used in three ways: (1) To replace threaded nuts and lock washers. Holes may be counter-bored with Speed Nuts, as they are called, pressed in and given a slight turn to lock themselves in bolt receiving position within recess. One



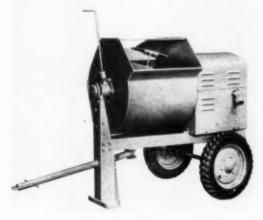
nut takes place of two parts, wider bearing surface is afforded and spring tension takes up yield of wood, preventing loosening and reducing assembly time. (2) Single or double Speed Nuts are tacked into blind location, as illustrated, and in bolt receiving position, eliminating large spanner washers, saving time and preventing loosening in handling and in actual use. (3) Use of Speed Clip for knob assemblies. Clip is pressed into hole and shaft of knob is pressed into clip expanding it so that outer annular groove at far end digs into wood, securely locking entire assembly.—Tinnerman Products, Inc., 2078 Fulton Rd., Cleveland, Ohio.



TO AID RUBBER CONSERVATION, combination of chemical age-resisters called Duramin is said to act on rubber, keeping it tough and alive, much as vitamins act on human system. It is said to be so potent that minute quantities ranging from 1/4 of 1 per cent to 2 per cent are all that is necessary in tires. Duramin seems to impart to rubber greater resistance to heat, sunlight and repeated flexure, three chief enemies which accelerate its deterioration. When used in sidewalls and treads, Duramin retards wear by imparting greater resistance to abrasion. Vitamin-like material also is used in important portion of tire between carcass and tread, producing cooler-running stock both by reducing amount of heat generated and providing better resistance.—B. F. Goodrich Co., Akron, Ohio.



MORTAR AND PLASTER MIXER, 6-cu.ft. capacity, has been redesigned and has three primary features; adjustable steel scraper blades, air-cooled power and paddle shaft seal. Scraper blades assure clean drum after every discharge, even when wear occurs. One-cylinder, 4-hp. gasoline engine is air-cooled for lighter weight and easier operation as there is no radiator to damage, no water pump to



cause trouble and no cylinder block to freeze in cold weather. Paddle shaft seal has finely ground surfaced collar revolving in contact with Neoprene ring which in backed by chamber packed with grease under pressure. Dirt and grout cannot seep past these seals into paddle shaft bearings. Other features: Fool-proof drum lock; automotive cantilever springs; disappearing towing tongue; engine cover opens away from shoveling side, protecting engine and gear box from sand, lime dust and other materials; constricted discharge lip prevents undue splashing; low shoveling height.—Chain Belt Co., 1,600 W. Bruce St., Milwaukee, Wis.

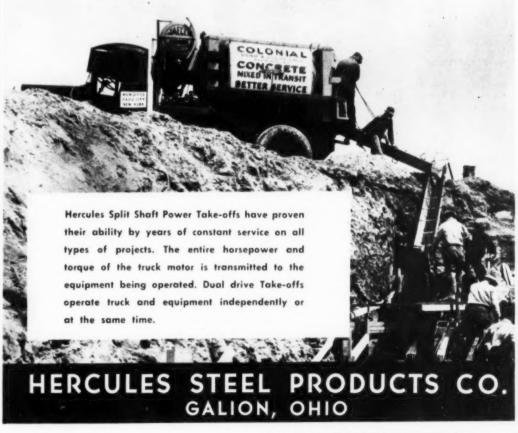


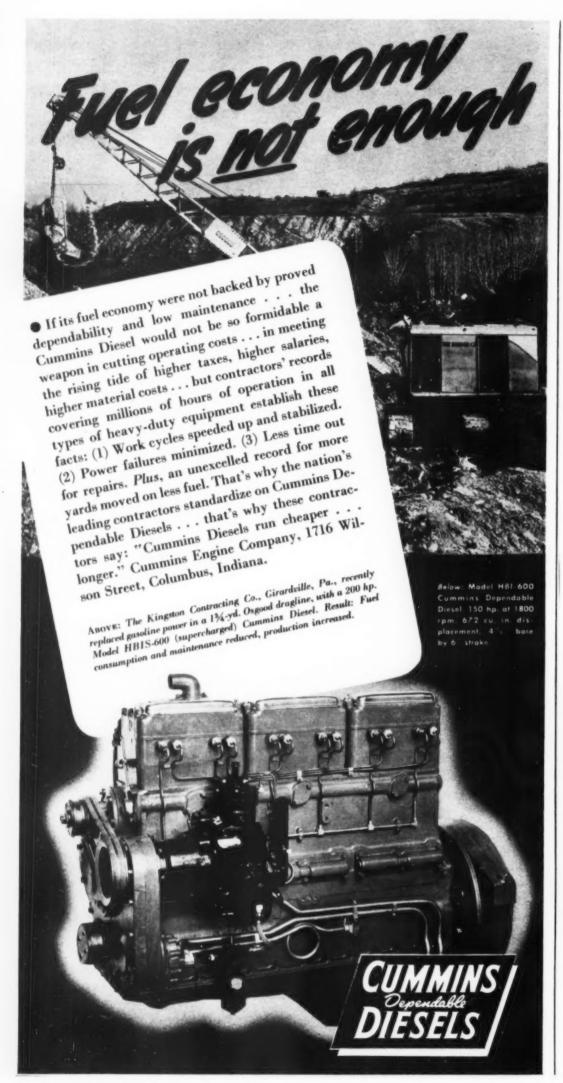
More than 160 Split Shaft Power Take-off operated truck mixers are in service in New York City alone.

Unit shown above mixes a 16 ton load of concrete (the largest truck mixer ever built). The mixing drum is operated through a Hercules Power Take-off, controlled from the truck cab. A flip of the cab lever stops or starts the drum even when loaded with $5\,\%$ to 8 cubic yards of concrete.

A TYPE AND SIZE FOR EVERY REQUIREMENT

Almost every type of truck mounted equipment can be operated efficiently and economically by Hercules Split Shaft Power Take-offs. Direct, offset, side and dual drive units are available. All units are engineered specifically for the truck chassis in which they are mounted.





RUBBER TIRED INDUSTRIAL TRACTOR is capable of hauling 13 tons of earth at 18 m.p.h. and is built especially for road building, construction and for use on national defense projects where speed, long hauls and other physical conditions are favorable to rubber tires. Unit is powered by 90-hp. 6-cylinder water cooled, automotive diesel engine and has tractive effort of 13,000 lb. in low gear with loaded wagon or scraper. Quick acting, vertical type gov-



ernor gives fast pickup. Constant mesh type transmission has five forward speeds ranging from 2.4 to 18 m.p.h. and reverse speed of 3 m.p.h. "High traction" differential said to give increased pulling ability under unfavorable ground conditions, plus longer tire and engine life. Braking system consists of foot-pedal-operated, independent, hydraulic brakes for each rear wheel of tractor, which permit operator to turn unit short in crowded places. To reduce operator fatigue and discomfort have been provided full floating seat assembly mounted on spring adjustable to compensate for varying weights by operators; finger-tip steering through hydraulic booster arrangement; readily accessible tractor controls. New 11-cu.yd. heaped measure, bottom-dump, pneumatic-tired wagon, built, for use with new tractor, has hopper-type body 13 ft. 2½ in. long, 6 ft. 11 in. wide at top and 10 ft. 10 in. by 4 ft. 9 in. at bottom. Depth is 3 ft.6 in. Bottom dump doors are hydraulically operated and are designed to permit ejection at any desired speed. Tractor-wagon combination weighs 24,500 lb. and measures 32 ft. 8 in. in length.—Caterpillar Tractor Co., Peoria, Ill.

ALUMINUM FLOODLIGHT with 90-deg. beam spread has been designed for all kinds of outdoor sports lighting as well as for all types of service in industrial yards, service stations and parking lots. Outstanding feature: waterproof hinged cover affords protection to lamp and reflecting surfaces against entrance of rain, dust, fumes and smoke. Cover is hinged at top and fastened to floodlight reflector by series of hand clamps around rim. Glass is fastened



to cover frame to prevent dropping out. Floodlight reflector has knife edge lip which compresses cover gasket to seal opening. Another innovation: streamline hood and vertical stop incorporated in crossarm mounting bracket by which floodlights may be tilted back over top of cross-arm for more convenient servicing and then returned to original setting by lowering to stop position. For football field lighting this unit is said to fill need for floodlight of slightly more concentrated beam characteristics than porcelain enamel open-type floodlights for use where poles are located 30 to 50 ft. back from sidelines.—Benjamin Electric Mfg. Co., Des Plaines, III.



NATIONAL DEFENSE

speed-up is forcing heavier service loads for longer working periods on all types of industrial equipment. Correct lubrication is the key to sustained top performance. For earth moving and road construction machinery there are . . .

.. SINCLAIR LUBRI-

CANTS designed to promote continuous operation at peak efficiency and at low lubrication costs. Sinclair's full line of oils, greases and fuels offer equipment operators maximum service under severe conditions. For quick deliveries, or for lubricating advice, call the nearest Sinclair office or write to Sinclair Refining Company, 630 Fifth Avenue, New York.

(Left) TOURNAPULL operated by McCarthy Improvement Co., Bloomington, Ill. Equipment Sinclair lubricated.



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March 1941 — CONSTRUCTION METHODS — Page 79

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Cheaper than wood FASTER..BETTER

Blaw-Knox STEEL STREET FORMS will do your street pav-ing work quicker and cheaper. The smooth steel imparts a smooth finish to the concrete, eliminating hand finishing.

Blaw-Knox Forms are built for long service; quick in-stallation and dismantling; and are rigidly braced to hold their position when being filled with concrete.

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- · Combined Curb and Gutter
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- · Any shape of Curb Face
- · Sidewalks, etc.





HYDRAULICALLY CONTROLLED MOTOR GRADER may be had for lower investment and used without sacrificing quality of work, according to its makers who list following advantages: (1) Powered by 31-hp. gasoline motor; (2) has mono-rail, box-type frame averaging 50 lb. to foot; (3) five speeds for-



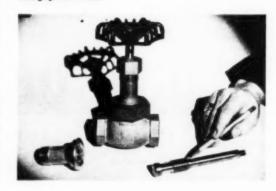
ward ranging up to 14.8 m.p.h. and reverse speed; (4) scarifier and blade lift operated by hydraulic control; (5) side shift and circle reverse hand-operated from cab; (6) steering direct and said to be highly efficient. Other design features: wide front axle with ample ground clearance to straddle front axle with ample ground clearance to straddle windrows; front wheels spaced to track with rear drivers; rugged draft beams with ball-joint connection; large diameter circle and heavily braced blade supports. Standard equipment includes 8-ft. blade, hydraulic wheel brakes and parking brake. Electric starter, horn, lights, canopy-type cab, 10-ft. blade, V-type scarifier and snow plow are optional—The Austin-Western Road Machinery Co., Aurora, Ill.

SINGLE BUCKET CABLE-CONTROLLED SCRAPER with struck capacity of 12.1 cu.yd. and heaped measure of 15 cu.yd. is designed for use with standard D8 tractor and is said to combine advantages of easy loading and large capacity. Ability to load without aid of pusher said to make it economical unit for use either singly or in fleets. Features apron cable dead-ended for longer cable



life; new apron design for increasing capacity, relife; new apron design for increasing capacity, reducing overflow and facilitating loading by reducing friction; new overhead traveling sheave assembly which keeps earth out of sheaves and lengthens cable life. Additional advantages: Positive ejection and regulated spread, controlled cutting, narrow 8-ft. 6-in. cutting edge, tailgate cable pull at load center and box beam arc-welded construction for strength and light weight. Bowl sides are built to eliminate loss of loaded material by overflow or spillage. In order to operate Carryall under all conditions, provision has been made to equip it either with four 13.50x20-in. tires or two 18x24-in. tires in rear and in front, either two 13.50x20's or two 18x24's.—R. G. Le Tourneau, Inc., Peoria, Ill.

LONGER WEARING VALVE STEMS AND BONNETS are made of new self-lubricating alloy called Hancodur which, makers claim, will outwear other stems and bonnets six times. Hancodur stems are said to have tensile strength of 90,000 lb. per inch, plus unusual resistance to galling and wear.—Hancock Valve Division. Manning. Maxwell & Moore, Inc., Bridgeroot. Conn.



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NO CRIMPING "FINGER PINCH" THAT SPOILS WIRE ROPE

When a Laughlin drop forged Safety Clip takes hold of wire rope, it means business. The solid fist-like grip is 50% more efficient than ordinary U-Bolt Clips, as proved by recent tests at a famous engineering school.

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PORTABLE AIR COMPRESSOR is small, compact, heavy-duty unit designed for pavement breaking, rock drilling, tamping, digging, spraying and other compressed air applications. Its capacity is 60 cu.lt. per minute actual air delivery at 100-lb. gage pressure and it is mounted on two-wheel trailer for rapid and inexpensive transportation behind truck or car. Supplied with universal coupling and



drop leg. Wood skid mounting available if truck transportation is contemplated. Powered by 4-cylinder Mercury V-8 engine having 3 3/16x3¾-in. bore and stroke. Other features specified by makers: Electric starting, force feed lubrication, en bloc construction, low fuel consumption and durability. Accessories: Two-wheel trailer includes compressor, hood, side doors, radiator and guard, battery, starter generator, oil bath, air cleaners on engine and compressor, panel board with all gages, and spring trailer with semi-elliptical springs and pneumatic tires.—Schramm, Inc., West Chester, Pa.

AIR-FEED ROCK DRILL MOUNTING, known as Jackleg, is designed for use with Ingersoll-Rand Jackhamers and helps to support drill, absorb recoil and feed it forward as hole is drilled into rock. Larger and faster drilling Jackhamers, can now be used in horizontal holes because operator does not have to



hold drill and push it forward as it drills, but instead uses Jackleg and has only to exert slight downward pull on handle of Jackhamer to balance lifting force exerted by pneumatic feed. Manufacturer claims increase of drilling footage in some cases as much as 50 per cent. Also says that miners are less tired and therefore less susceptible to accident; that rock drill upkeep costs are reduced as there is less wear on chuck bushings and fronthead parts. Weighs 35 lb. Easily, regulated by conveniently located pressure throttle.—Ingersoll-Rand Co., 11 Broadway. New York City.



 When equipment breaks down, production schedules are knocked into a cocked hat and profits fly out the window.

That's why Byers builds shovels and cranes to "stand up and take it". Open hearth castings, uniform rolled steel sections, annealing, heat treating, anti-friction bearings, balanced design . . . all contribute to Byers' reputation for building sturdy shovels and cranes.

This is another reason why you should in-

This is another reason why you should investigate Byers 3/8 to 3/4 yd. sizes.

11 FULLY CONVERTIBLE MODELS IN 3/8-1/2-5/8-3/4 YD. SIZES



Simplex Jacks are right on their toes!

They lift their full rated capacity on the toe as well as on the cap. You can get a low hold on machinery, beams and other objects to be raised, lowered, leveled or supported. The safe, rugged Automatic

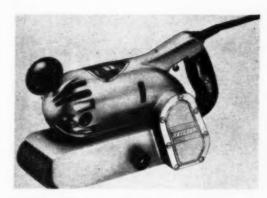


Raising and Lowering Jack shown, No. 22, lifts a full 10-tons 12½"; No. 24-A lifts 15-tons; No. 2029 lifts 20-tons. These are only a few of the many Simplex Jacks designed to speed work and cut corners on construction projects. See them all in Catalog 40.

TEMPLETON, KENLY & CO., Chicago Better, Safer Construction Jacks Since 1899

Simplex Jacks

dependable and efficient Lever Type for toe and cap lifting. Hydraulic for easier cap lifting. Screw Jacks for economy.



COMPACT BELT SANDER—Lightweight 21/4-in. unit, called "zephyrplane Junior" is said to be of especial value to boat owners, home craftsmen and other users of light-duty tools of this type. Features: Diecast aluminum frame; ball-bearing construction bakelite handle; trigger-type momentary switch; "touch-control" lever which permits quick changing of belts. Belt travels at speed of 600 sur, ft. per minute, is kept uniformly taut by coil spring and can be centered by simple adjustment. Variety of belts makes it possible to use tool on wood or metal, for removing varnish and for polishing.—Skilsaw, Inc., 5045 Elston Ave., Chicago, Ill.



ALUMINUM STRAIGHT LADDER, said to combine advantages of easy portability, rugged construction and low cost, is recommended for many industrial uses such as oiling and repairing machinery, building maintenance and certain construction activities that involve frequent moving of ladder by one workman. Constructed entirely of aluminum alloy 61 S.T., having tensile strength of 48,000 lb. per square inch. Side rails and 34-in. round rungs are said to be sufficiently strong to support heaviest workman with safety. Made in various sizes up to 16 in. wide and 20 ft. long. May be fitted with safety shoes, if desired.—Aluminum Ladder Co.. 373 Adams St., Tarentum, Pa.

PORCELAIN-ENAMELED ROOFING AND SIDING for industrial buildings is of corrugated metal coated on both sides to resist corrosion and provided with watertight interlocking joint between sheets. There are no exposed bolt holes and joint between these Por-Ce-Lok sheets is equipped with internal gutter to carry away drainage water and provide positive



barrier against seepage. Each sheet receives two coats of tough, flexible porcelain enamel. Stock sheets 24 in. wide are supplied in lengths of 5, 6, 7, 8, 9 and 10 ft.; half sheets 12 in. wide also are available for starting and finishing rows to produce staggered end laps. Special flashings for roofing ridges, corners and other intersections. Full range of colors available, including blue, maroon, green and brown.—Porcelain Steels, Inc., Cedar and Ashland Road, Cleveland, Ohio.







WHEN HAUSMAN SETS YOUR FORMS

Contractors in all parts of the country who have used Hausman Form Service are glad to be relieved of responsibility of form setting and are enthusiastic about the ease and efficiency with which Hausman works with their organizations.

They are also highly pleased at the economy of Hausman service and the savings, as well as the speed, it permits them to make on a job.

Call Hausman on one of your jobs and see for yourself the many advantages in maintaining time schedules . . . elimination of delays . . . close cooperation of Hausman field men with your organization. We'll be glad to bid on any job you now have or contemplate. Write for an interview.

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Hausman also builds ribbed slab forms, removable steel forms for all types of construction where steel forms are economical and adjustable round column molds for multi-story buildings.

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by JACKSON





Air cooled gas engine drives vibratory unit through short flexible shaft. Engine and handles mounted on vibration absorbing cushions. Screed is one piece formed steel—transmits vibration uniformly. Vibratory unit simply and ruggedly designed.

GIVES YOU SPEED - AND A PERFECT JOB - ON

concrete floors, decks, ramps, airport runways, walks, slabs. Quickly puddles and places low-slump concrete — you start finishing right away. Available in 8—10—12 Ft. lengths. Write for complete details and recommended construction procedure.

BUY A JACKSON AND BE SURE

ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Michigan



LINK-MOUNTED REFLECTORS for use in making all types of signs are said to be as flexible as they are strong and may be mounted easily on any surface with screwdriver or hammer. Tack on like tape or fasten with screws to sheet metal, wood or plastic forming letters, symbols or numbers, even in script. Reflectors are of multiple reflex type, individually molded and said to return brilliant light at great distance and at wide angles. Manufacturer also offers line of pavement surface markers and reflector chain for highway markers, such as traffic signs, bulls-eyes, post and berm lights.—The Star-Lite Co., 312 E. Market St., Indianapolis, Ind.

ROTARY WHEEL TRENCHING MACHINE. mounted on and powered by 1½-ton truck with dual tandem rear wheels, digs to depth of 5½ ft., cutting clean trench up to 22 in. wide. Spoil discharged to either side of machine. Power from specially built transmission is delivered to excavating wheel through constant-center drive said to provide for steady,



smooth digging at any depth or any wheel speed, eliminating chain whip. Excavator wheel hoisted clear of ground when truck is ready to move. Overall height of 11 ft. 10 in., provides ample clearance for viaducts, underpasses and bridges. Follows any line, straight or curved, will dig up and down steep grades and excavate gumbo, hardpan and impacted gravel. Makers claim that one man can dig from 2,000 to 5,000 lin.ft. of trench per day, depending on soil conditions. Trench to accommodate 4-, 6-, 8-, 10-, 12- or 16-in. pipe can be excavated. — The Buckeye Traction Ditcher Co., Findlay, Ohio.

AUTOMATIC BENDING MACHINE for bending reinforcing bars may be had in two sizes: No. 40 for bending 1½-in. round bars and 1½-in. square bars; No. 50 for bending 2½-in. round bars and 2-in. square bars. Machines will make following bends: (1) Hooks and angles on slab, truss or offset bars; (2) stirrups; (3) spirals and rings; (4) radius bend-



ings—arcs and bows; (5) will bend plain, deformed, twisted or Isteg bars. Steel plate machine housings. Gears have machine cut teeth of special hardened steel. Gears run in ball bearings or bronze. Nickel steel hardened bending pins and sleeves. Equipped with wheels for portability and with index plates and dials on which any type bend can be set up and made automatically, thus eliminating all guesswork. Two clutches consisting of steel drum and bronze cone operated by hand or foot lever turn bending plate either right or left, as desired. Two bendings may be made in one operation, of especial value in bending truss bars. Powered by 5-hp. motor.—G. D. S. Machinery & Supply Co., 101 Walker St., New York City.







A NATION-WIDE OF FROM PAVING CONTRACTORS MUST BE EARNED



A TEXACO job of the Gallagher Asphalt Company, Thornton, Ill.



A TEXACO-surfaced road in Devil's Tower National Park, Wyoming, constructed by the Northwestern Engineering Company, Rapid City, S. D.



The Gulf Bitulithic Company, Houston, Texas, resurfacing a Houston street with TEXACO asphalt.

Look around the country during any paving season at the street and highway projects under construction.

One fact you cannot miss is that everywhere you look—New England, the South, Middle-West, Southwest and West—contractors are paving with TEXACO Asphalt.

A nation-wide O.K. from paving contractors isn't something that just drops into your lap. It has to be earned. And TEXACO Asphalt didn't earn it overnight, but over a third of a century. A third of a century of supplying consistently high-grade Asphalts, backed by consistently dependable service.

When you have an Asphalt problem, call on TEXACO. Request our nearest office to send a representative.

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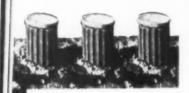
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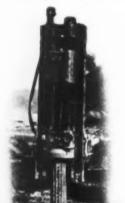
You Can Install More Piles Per Hour with MONOTHRES



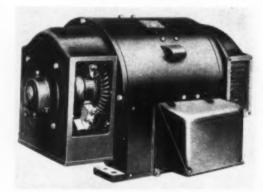
Nothing goes up until the piling goes down. Any method of pile construction that will even save hours is highly desirable today.

Job records show use of Monotubes for installing cast-in-place concrete piles has resulted in time savings of many days, yes, even weeks. Here's why: Tapered steel Monotubes are light weight for fast handling. Speedy driving is a certainty because these cold rolled steel casings require no driving mandrel. Use of any crawler crane equipped with standard leads and hammer simplifies equipment problem.

Monotubes are made in gauges, tapers and lengths to meet every soil condition. Union Metal's experienced foundation engineers are always at your service. Write for Catalog No. 68A.



UNION METAL MANUFACTURING CO. NEW LINE OF D.C. MOTORS with sleeve or ball bearings have newly designed rolled-steel frame and improvements in end-shield and bearing-bracket construction which are said to give excellent protection from external damage. Use of Formex wire coils and recently developed Glyptal insulating varnish provide high resistance to impact, abrasion and action of foreign materials. Open

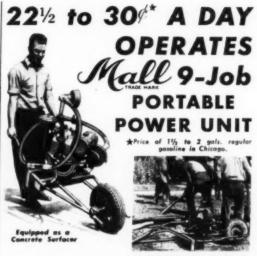


motors available in constant speed ratings from \$V_2\$-hp. at 850 r.p.m. up to and including 60 hp. at 1,750 r.p.m.; and, in adjustable speed ratings from \$V_2\$ hp. at 850/3,400 r.p.m. up to and including 15 hp. at 500/1,800 r.p.m. Motors in larger ratings (beginning at 50 hp., 850 r.p.m.) embody additional design innovations such as new system of ventilation, extra protection of all current-carrying and rotating parts, and large conduit boxes. New V-type double-brush holders give better commutation and permit rotation in either direction. New type lifting lug facilitates handling.—General Electric Co., Schenectady, N. Y.

IMPROVED VERTICAL TURBINE PUMPS. 6-in., medium capacity, have newly designed impellers and seats which, according to manufacturers, assure higher efficiency, better performance and lower cost to users. For capacity of 100 g.p.m. against 110-ft. lift in well and 50-lb. pressure above, 7½-hp. motor is required, as against 10-hp. motor with old model. Efficiency of this pump has been increased 6½ points; number of stages has been reduced one-



fourth. Other advantages: water lubrication with no stuffing box below ground level; specially designed semi-open impeller can be adjusted from surface of wear and for changing capacity; non-sand-locking and non-gas locking. Bronze semi-open impellers operate in cone-shaped seat in pump bowls. Correct curvature of impeller vanes assures maximum lifting capacity and prevents overloading of motor regardless of changes of water level. Company claims to make every type and size of vertical pump from small domestic unit delivering few gallons per hour to large Niagara type, delivering 100,000 g.p.m.—The Pomona Pump Co., 665 East Commercial St., Pomona, Calif.



Equipped as a Concrete Vibrator

An ALL-PURPOSE TOOL Readily Adaptable For *CONCRETE VIBRATING *CONCRETE SURFACING *FORM SANDING *SHARPENING TOOLS *WIRE BRUSHING *SAWING *PUMPING *GRINDING *DRILLING

The low power cost of this big capacity, all purpose unit is only one of its profit-making features. It is easily portable, easy to start, runs by itself, and furnishes high-speed power for 9 important interchangeable tools. In addition, it will save you hundreds of dollars ordinarily spent for single-purpose machines, reduce idle machine-hour losses and cut maintenance costs. A national network of MALL distributors and agents in all principal cities assures you of prompt service regardless of where YOUR job is lo-

regardless of where YOUR job is located. Write TODAY for Free Demontration and new 1941 catalog.

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Chicago, Illinois



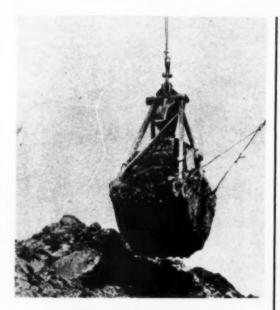




PRACTICAL-LOW COST

Supplies abundant fresh air in tunnels, continuously and economically. Easily and quickly installed by unskilled workmen because of patented non-rusting demountable couplings which also permit adjustment to meet varying stresses due to difference in size and weight of tubing. Can be bought by the foot — cut off to any length — no waste. Vertical or horizontal installation and can be turned round corners or suspended out of working spaces. Four grades of fabric especially treated to resist corrosive conditions and to reduce air friction. Mine-Vent has been used for many years under all kinds of mining conditions and has proven itself longest lived and most economical in the long run. We also carry a full line of tarpaulins, covers, etc. Let us give you more detailed information.

AMERICAN BRATTICE CLOTH CO. WARSAW, INDIANA



INDUSTRIAL BROWNHOIST BUCKETS STEP-UP PRODUCTION . HELP CUT HANDLING COSTS

Built in rope-reeve, power-wheel, lever-arm and link types, there is an Industrial Brownhoist clamshell bucket designed to best meet your specific handling needs. Durable, strong and easy to operate. Capacities from $\frac{1}{2}$ to 15 yards. Write today for catalog 353.

INDUSTRIAL BROWNHOIST

BAY CITY, MICHIGAN + DISTRICT OFFICES: NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

MEN-get complete all weather protection

with TOWER'S RUBBERIZED

SUITS, COATS and HATS



Tower's waterproof, rubberized work clothing gives dependable, durable performance. Medium weight and designed to give the utmost in freedom of movement and comfort. No cemented seams to pull apart. A choice of styles and full line of sizes to fit every requirement. Unaffected by high or low temperatures.

Also available in oiled type garments if desired. Sold by all good Dealers or

A. J. TOWER CO.
BOSTON, MASS.

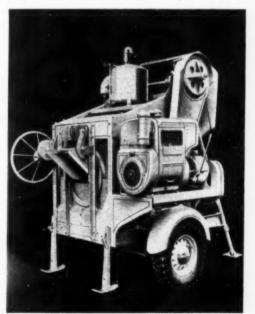
Makers of Waterproof Clothing Since 1836

ENGINE-OVER-DRIVE MOTOR GRADER powered by 50-hp. diesel engine, is claimed by its makers to be capable of maintaining roads from bank to bank, including backsloping. Unit is built around an all-welded, box-type main frame said to be strong and rigid, to afford unhampered visibility of blade and to offer wide range of blade positions. Operating advantages listed by manufacturer: (1) With same setting of lift linkage and with blade centered, adjustment may be made from deep ditching to high bank-cutting position in about 40 sec., and on



90 per cent of work without operator leaving cab. Blade can be set vertically, if desired, and wide shoulder reach and flat-bottom ditching positions can be obtained; (2) circle is full-revolving and blade can be set to ditch or move earth with machine operating in reverse gear. Blade can be reversed with scarifier on machine simply by lifting scarifier teeth out. Eight forward speeds (with high top speeds for traveling) and two reverse speeds. Balanced weight distribution permits surface maintenance at 6 to 7 m.p.h. without objectionable bouncing or vibration. Wide range of blade adjustments in all directions, tandem drive with low pressure tires and leaning front wheels permit these graders to be utilized on all types of surface, ditch and bank work. Optional equipment includes scarifier, canopy top, cab inclosure, starting and lighting equipment and V-type snow plow and snow wing.—J. D. Adams Co., Indianapolis, Ind.

LATEST MODEL 10S MIXER, named "Speedline," is powered by Wisconsin Air-Cooled engine said to be not only lighter, simpler and more compact, but to eliminate usual hazards of cold weather operation. It is claimed that radiator, water pump or cylinder block will not freeze or give other trou-



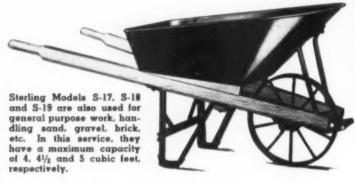
ble, and therefore, no anti-freeze is necessary. Greasing is eliminated since power unit is automatically lubricated. Other outstanding features: automotive-type transmission, fully inclosed, running in oil bath, machined steel drum tracks, crisscross remixing drum, automatic skip shaker, "pressure" discharge, water regulator and discharge trailer design with 2- or 4-wheel mounting interchangeable—Jaeger Machine Co., Columbus, Ohio.





FOR CONCRETE REASONS Contractors Prefer STERLING WHEELBARROWS

built by WELLMAN



FOR concrete work, Sterling Models S-17, S-18 and S-19 are selected by leading Contractors because of these outstanding features:

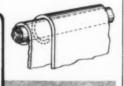
Perfect Balance 10-Spoke Wheels
Self-Lubricating Bearings
Welded Trays Heavy Tray Rod
Malleable Wheel Guards
Channel Steel Legs
Square-Bent Leg Shoes
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Malleable Iron Wheel Brackets
Hard Maple Handles

Capacities, 3, 3½ and 4 cu. ft. struck.

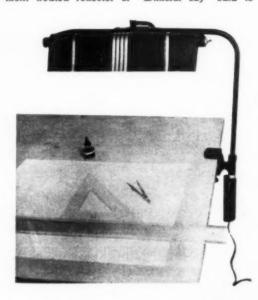
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An Exclusive Sterling Teature
Where tray sheets lap, both thicknesses are folded over the continuous butt-welded reinforcing rodthus giving additional rigidity and
strength.



ENGINEERS FLUORESCENT DRAFTING TABLE LAMP, said to approximate north daylight, is available in two models—one for fastening to drawing surface by clamp and other with screw anchor attachment for permanent installation. Feature: pigment treated reflector or "artificial sky" said to



balance heavy, blue light common to ordinary fluorescent lighting and to produce neutral, colorless light, making eye work quicker and easier. Advantages: (1) Said to produce two and one-half times light intensity of incandescent light using same amount of power; (2) gives cool illumination, producing one-fifth as much heat as incandescent light; (3) quick, positive adjustments set to swivel arm at any position from table top to 24 in. Shade adjustable to horizontal arc 360 deg.; vertical arc 180 deg.—The Frederick Post Co., P. O. Box 803, Chicago, 111.

EMERGENCY JACK for use in heavy industries has full 20-ton lifting and holding capacity on either cap or toe lift. Is 30 in. high, has full 17¾-in. lift and weighs 167 lb. with complete equipment. Besides lifting on cap and toe, it lifts on auxiliary shoe which hooks on to cap or is fastened to chain with



grab hook, any link of which can be engaged with recess in cap. In addition to lifting and lowering vertically, jack tilts on base for jacking at angle. Tilting pawl can be released by operator's toe. May be used horizontally for pushing, spreading or pulling by chain. Recommended for mines, skidding rigs, mills and utility service, and for construction and engineering projects where heavy machinery is used and where emergencies necessitate aid of heavy-duty jack.—Templeton, Kenly & Co., Chicago, III.

MODEL LS-85 · 3/4 YARD

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places under control Mr. X. S. Water - that "trouble maker" in concrete construction.

Because of thorough cement dispersion when High Early Pozzolith is added to regular portland cement, there results a 15-20% reduction in water needed for placeability. By reducing the water High Early Pozzolith produces concrete of minimum porosity, shrinkage, cracking, and permeability,—makes concrete watertight by attacking the big cause of leakage,—excess water in the mix.

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Using High Early Pozzolith in regular portland cement produces rapid hardening,—28 day strength in 7 days,—3 day strength in 1 day. YOU SAVE TIME AND MONEY!

The mobility and cohesiveness of the concrete are greatly increased by High Early Pozzolith, expediting the work and improving the finished results.

How Pozzolith Improves All Concrete

Pozzelith contains Master Builders' cement dispersing agent. Cement particles in their normal state in water tend to gather together in busches; i.e. flocculate. This bunching entraps water within the particle clumps. See microphosparach bolders



With Master Builders' dispersing agent these hunches are broken up into individual cement particles distributed throughout the water; i.e. dispersed or deflocculated. See microphotograph below.



This dispersion makes the cement usable to its full efficiency; all the cement surface in made available for hydration and all the water for lubrication of the mix. (Water held within the particle clumps is released.)

As a result of adding a dispersing agent to cement there occur,-

Greater worksbility wis

less water.

Increased strength.

Increased durability (highor resistance to freezing and thawing, and corro-

Get the complete story of Coment Dispersion. Ask for Research Paper No. 35.

There are two types of Pozzolith, Standard and High Early. High Early provides all the advantages of Standard plus rapid hardening. Send for the complete story.

THE MASTER BUILDERS COMPANY
Cleveland, Ohio Toronto, Canada





PAVING BREAKER of medium weight may be used where handling ease is main requirement as lighter weight makes it possible for operator to handle tool with greater speed and less fatigue and thus to increase output. Designed for general demolition—street and wall openings, asphalt cutting, digging and on other odd jobs where single tool is needed. May be fitted with special head for driving spikes up to 12 in. long.—Independent Pneumatic Tool Co., 500 W. Jackson Blvd., Chicago, Ill.

ABSORPTIVE FORM LINER for concrete construction, development of insulating board, is designed to produce finer-textured surfaces, absence of surface voids, less crazing of surfaces and greater durability of concrete by eliminating air bubbles and excess water. New Fir-Tex material for lining concrete forms is made in sheets of felted wood fibers specially treated to increase absorptive properties



and to prevent bonding with concrete. Applied by nailing sheets to inside surfaces of standard wood forms. Use of liners is claimed to affect structure of concrete to depth of 1½ in. from face of form, increasing strength, hardness and density. Resultant smoothness of surface reduces need for linish by grinding or rubbing with abrasive material, thus eliminating item of cost. In accompanying illustration smooth faces of concrete blocks were cast against absorptive form liners while sides were not.—Fir.Tex Insulating Board Co., Porter Building, Portland, Ore.





Power-controlled Grader, equipped with Wisconsin Heavy Duty Air-Cooled Engine.

Any climate, any season, any job . . . Wisconsin heavy-duty air-cooled engines

supply the steady, dependable "power push" to carry on . . . no matter how tough the going!





MORE PROFIT LESS MAINTENANCE... when they're on the job...

Here's a one-man tool that can do a hundred and one jobs on any construction project. One man and a Coffing Safety-Pull can lift, pull, move, and do many emergency and repair jobs. Then there are the big jobs where batteries can be set up such as shown in illustration. Here are 7 Model F Safety-Pulls lifting forms on the Marshall-Ford Dam in Texas. When used in batteries they exert powerful uniform action that makes them invaluable for many kinds of construction work. Let us send you circulars telling all about Coffing Safety-Pull Hoists — their safety features—their efficiency—their easy portability—their low first cost.

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Here's a diesel oil that can "take it." Proof? Shell Rudis Oil has already proved itself 3 ways. Tested in the laboratory, in test engines, under the toughest kind of field operating conditions, Shell Rudis came out with a record performance every time.

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Special jobs often require special tools and while rock handling problems are doubtless common to many, OWEN has perfected and proved the special tool for this job in the Type RA Rock Grapple. Revolutionary, independent tine action, enormous lifting capacity and other exclusive features distinguish it decidedly from other equipment intended for like use. Write for the new catalog, just off the press.

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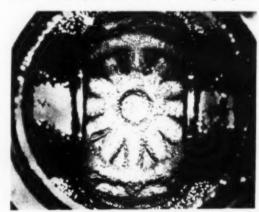
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Branches: New York, Chicago, Philadelphia, Berkeley, Cal.

AN IMPROVED COMPOUNDED LUBRICANT, recently introduced under name Essolube HD, for heavy-duty service in internal combustion engines, particularly diesels, is designed to keep engines cleaner than is possible with straight mineral oil, lessen oil deterioration, remove carbon deposits, insure stability against oxidation and heat, protect bearings from corrosion and prevent stuck or clogged piston rings. Additive or compounding element introduced



COMPARISON OF CLEANSING ACTION of new compounded lubricant (above) and straight mineral ail (below), showing relative carbon deposits on under side of diesel engine piston.



into lubricant is claimed to produce an unusually effective "detergent" or cleaning action, involving (1) purging of carbon deposits in engine and (2) dispersion of these products as minute particles which are carried in oil instead of lodging in engine and are drained out when change of oil is made. New lubricant has high viscosity index of approximately 100, insuring great stability and easy starting in cold weather, as oil remains fluid at low temperatures. Essolube HD is approved by Caterpillar Tractor Co. and passes test requirements of General Motors Corp. It is recommended by its makers both for gasoline and diesel engines. New compounded lubricant is result of five years of research in Esso Laboratories at Bayway, N. J.—Standard Oil Co. of New Jersey. 26 Broadway. New York, N. Y.

He

PORTABLE BLOWER, capacity 4,000 c.f.m., for public utility field is said to be great protection to life and health of underground workers. Blows out hot and foul air from conduits carrying heat pipes or other utilities. Removes sewer gas where work and inspection have to be done on sewer mains. Blows impure air from manholes and other places where



close quarters must be ventilated for safety of workmen. High-speed, spring-mounted, automotive-type trailer permits outfit to be towed behind truck or car. Power unit is heavy-duty 2-cylinder Novo engine. Other features: Heavy-duty crankshaft on roller and ball bearings, extra heavy flywheel for smooth operation and large gasoline, oil and cooling capacities permitting long periods of operation.

—Novo Engine Co., Lansing, Mich.

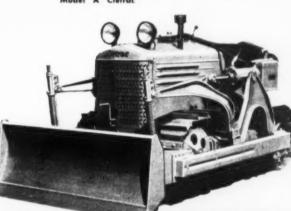


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Heil Trailbuilders and Bulldozers like all Heil road machinery is designed and built by a responsible pioneer manufacturing organization that knows how to produce efficient, dependable equipment . . . You too can capitalize on the profit advantages of Heil Trailbuilders and Bulldozers. They're fast operating — foolproof — ruggedly constructed and they're made in all sizes for mounting on small, medium and large

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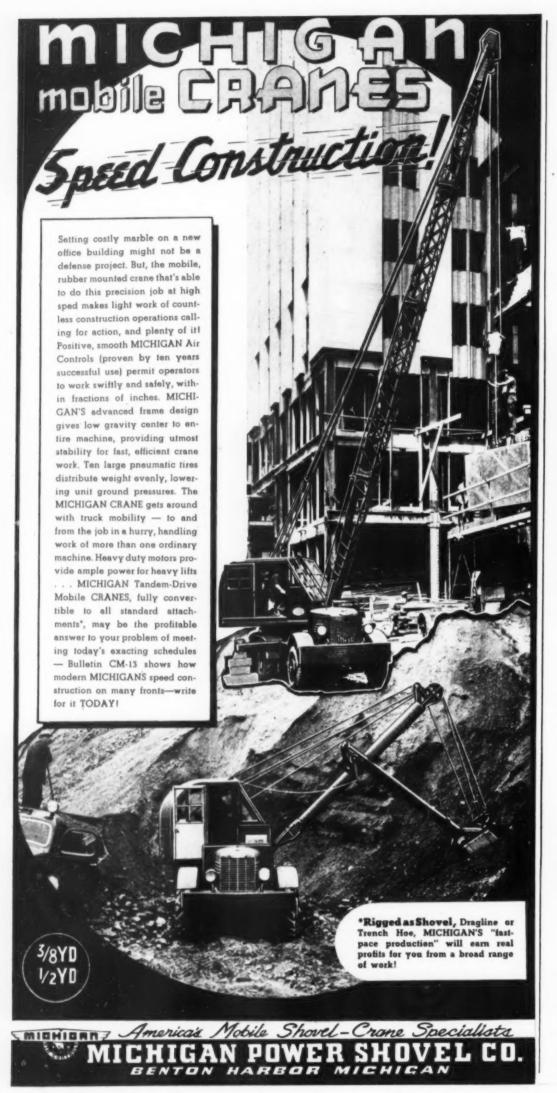
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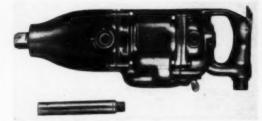


LEFT — Heil Twin-Cable scoops load fast — dump fast — haul profitable, heaping loads. Send for free catalog.

RIGHT—Heil Hydraulic Scoops have proved their dependability on tough jobs like the Pennsylvania Turnpike. Complete facts and recommendations are yours for the asking.







PNEUMATIC BOLT WRENCH is impact type tool for driving or removing nuts up to $1^{1}/_{4}$ -in. bolt size. New Thor unit is reversible and has sufficient power for driving larger size nuts than those above indicated on some kinds of work where torsional requirements are not extreme. Weight, 29 lb.; spindle size, 1 in. square; overall length, 19 in.; spindle offset, 2 7/16 in.; hose connection, $1/_{2}$ -in. diameter.—Independent Pneumatic Tool Co., 600 West Jackson Boulevard. Chicago, Ill.

STATIONARY COMPRESSOR, two-cylinder, single stage, of precision design, suitable for small industries and standby service is compact, lightweight, smooth running unit requiring little floor space and minimum power, Features: Complete air cooling, built-in after cooler, force feed lu-



brication, heavy duty ball main bearings, low lift, long life valves, air filter silencers on each cylinder, automatic regulation and easy accessibility for inspection. Five sizes: 96 to 233 c.f.m. displacement; 15 to 30 hp.; air pressures 30 to 125 lb. Smallest size is 2 ft. 5 in. long, 2 ft. 9 in. wide and 2 ft. 4 in. high. Supplied as complete motor-driven units on rigid steel sub-base, direct connected or V-belt driven; also minus sub-base with V-belt sheave or flat belt pulley.—Sullivan Machinery Co., Woodland Ave., Michigan City, Ind.

12-IN. ELECTRIC HAND SAW. SPEEDMATIC TYPE. is now equipped with 3-phase, 220-v. motor, thus providing it with ample power for heavy-duty cutting. Manufacturers also produce radial arm in which this Speedmatic may be used; thus tool serves as electric hand saw and as power unit in over-arm saw combination said to be capable of cross-cutting and ripping any angle or compound angle. Saws are used for cross-cutting, dadoing, tennoning

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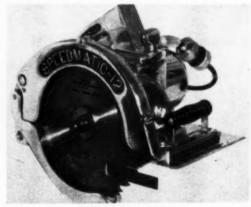
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straight or at an angle; ripping, plowing, grooving, beveling, scoring, pointing, channeling, compound mitering, pocket cutting; for cutting wood, stone, tile and all other building materials. Saw quickly attached to radial arm converting it into overhead cut-off and rip saw. Dadoing, mortising, compound angles, cross-cutting and ripping said to be easily done. 1½-hp. a.c., d.c., motor. Cuts to depth of 4¾ in. Speed 3,600 r.p.m.; weight, 34 lb.; length 17¼ in. Adjustable for depth and bevel.—Porter Cable Machine Co., Syracuse, N. Y.



1941 CONSTRUCTION COSTS Incorporated with April 24

Engineering News-Record

Published earlier than usual, the 14th edition of this widely used Yearbook will appear at a time when the planning of our defense construction will be at a peak. Morover, the statistics of pace-setting 1940 will be available sooner. Here is a brief outline of the valuable data packed between its covers:

Review of 1940 Costs . . . Engineering News-Record Cost Indexes . . . Special Building Cost Indexes . . . Railroad Cost Index . . . Public Utility Construction Index . . . Lambert's Utility Cost Trends . . . Boeckh Building Cost Index . . . Bond Interest and Money Rates . . . Prices of Construction Materials . . . Construction Wage Rates . . . Roadbuilding Costs . . . Compensation Insurance Rates . . . Small House Costs . . . Costs of USHA Housing . . . Labor and Materials on PWA Housing

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STEEL PIPE FOR TUNNEL VENTILATION, available in sizes from 18- to 30-in, diameter and in lengths as required, is designed either for blowing or exhausting air. Air-tight self-centering joints, easily assembled or dismantled, are made by bolts passing



through four anchor lugs on each end of pipe sections. Rubber gaskets in joints prevent air leakage. Circumferential stiffening rings assure pipe rigidity. Smooth interior surface and reduced joint spaces cut friction losses and pumping costs for delivering air. This type of ventilating pipe has been used by five contractors on tunnel work for New York City's Delaware River water supply. — Lock Joint Pipe Co., Ampere. N. J.

IMPROVEMENTS IN FORD 1941 ENGINES, 85- and 95-hp., V-8, include new bolted-on camshaft gears; valve stems hardened still more where they fit into guides; engine vacuum connection newly located on manifold riser for better operation of windshield wipers and distributor governor; rear springs newly designed with twelve leaves instead of ten for greater load carrying capacity; auxiliary springs distribute load more equally on all eight rear spring brackets. New frame reinforcements available at extra cost on trucks and chassis intended for heavy-duty service. Operators may select from seven different stake units in new line: (1) 158-in. wheelbase "regular" with load space 142x82 in.; (2) 134-in. wheelbase stake with load space 106x82 in.; (3)



134-in. wheelbase cab-over-engine stake with load space 142x82; (4) 101-in. wheelbase cab-over-engine stake with load space 106x82 in.; (5 and 6) 1- and 34-ton stakes with load space 90x74 in. and (7) 112-in. wheelbase stake with load space 80x67 in. In addition to above units, following are offered: (1) Four panel units; (2) de-luxe type sedah delivery; (3) open-type express bodies; (4) arm-type and direct-lift type hydraulic hoists on dump truck, capacity 1½ cu.yd.; (5) for tractor-trailer operations, 134-in. wheelbase regular and 101-in. wheelbase cab-over-engine are available with shortened frames at no extra cost; ¾- and 1-ton trucks equipped with 3-speed transmission. For haulers with special operating conditions to meet two-speed axle is available at extra cost on "regular" and cab-over-engine trucks. It has low speed ratio of 8.11 to 1 and high speed ratio of 5.83 to 1. Shiftoguide speedometer again included with cab-over-engine trucks.—Ford Motor Co., Detroit, Mich.



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To maintain vital production schedules, it is highly important to use the kind of equipment that will give long and trouble-free service . . . consistently.

When it comes to wire rope, you can depend on "HERCULES" (Red-Strand). Proof of this is the fact that for over a period of 55 years it has been demonstrating its ability to meet the requirements of peacetime progress, as well as the demands of great emergencies. It has been able to do so because of the sound fundamental principles that have always governed its manufacture.

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In order to be suitable for all conditions, "HERCULES" (Red-Strand) Wire Rope is made in a wide range of both Round Strand and Flattened Strand constructions — all of which can be furnished either Standard or Preformed.

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NEWS FROM MANUFACTURERS About Their Products

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use

4-WHEEL SCRAPERS - Bucyrus-Erie Co., South Milwaukee, Wis. (24 pp., two colors illustrated.) Begins its story with review of all features incorporated in

these new scrapers. Then it discusses each in detail: doub-le-curve cutting edge, bal-anced weight, positive rolling ejection and controlled depth of spread, with particular em-phasis on way each feature helps give earth movers faster time cycle and more produc-tion. In addition, new Bucyrustion. In addition, new bucyrus-Erie power control units are illustrated and described. Low-maintenance factors such as simplified design, straight-line cable reeving and careful en-gineering are discussed. Use of scraper as a fin-ishing tool is given attention. Complete specifica-

tions on four sizes of scrapers.

REVERSIBLE TRIP-BLADE SNOW PLOW—Wm. Bross Boiler & Mig. Co., Minneapolis, Minn. (1-p. leaflet, illustrated.) Built in seven models, with moldboard lengths varying from 8 to 10 ft., the Sno-Flyr trip-blade plow is designed for attachment to trucks. Under-frame hitches are used exclusively. Pushing is done from rear of cab and front of truck frame. Plows are equipped with self-aligning runners. Trip springs, completely inclosed to prevent freeze-ups, allow plow to pass over obstructions. Moldboard allow plow to pass over obstructions. Moldboard heights range from 24 to 42 in.

CONTRACTOR'S SCREEN—Robins Conveying Belt Co. Passaic, N. J. (4-p. folder, illustrated.) Double-deck vibrating unit for accurate sizing and salvaging of crushed stone, sand, gravel, slag and other bulk materials. Adaptable for roadside use and small quarry operations. Driven by 2-hp. gasoline engine. Capacity, three sizes at 100 tons per day. Size of screening surface, 16x36 in. Weight, 400 lb.

*

WELDING ELECTRODES—Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. (12 pp., illustrated) Crucible-weld a.c. and d.c. Flexarc welding electrodes for every industrial requirement are described. Electrodes for the welding of various classes of mild carbon steel, cast iron, stainless steels, aluminum, copper and its alloys, and manganese, and electrodes suitable for arc cutting and heard surfacing are listed. Physical preparities and ganese, and electrodes suitable for arc cutting and hard surfacing are listed. Physical properties and uses of each electrode, and various types of welds produced are discussed. Comments are given on solution of minor welding difficulties. Included are tabulations of available lengths, weights, approximate number of rods per pound, and recommended welding current values for various electrodes.

*

AUTOMATIC VALVES—Golden-Anderson Valve Specialty Co., Fulton Building, Pittsburgh, Pa. (96 pp., illustrated.) Catalog No. 26 covers various types of automatic control valves especially designed for stem and water sprise for steam and water service under both high and low pressure service conditions. Line includes triple-acting and single-



acting non-return valves, steam and water pressure reducing valves, altitude valves of various types, float valves, check valves. Tables of engineering data and flange data are included.

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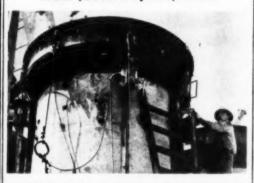
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5 Sizes · Cuts of from 2" up to 43/4"
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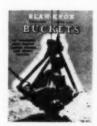
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500 LEXINGTON AVE.

HOMER CITY, PA.

TWO-LINE LEVER-ARM CLAMSHELL BUCKETS—Blaw-Knox Co., Pittsburgh, Pa. (36 pp., illustrated).
Culminating 3-yr. program of bucket redesign and standardization, manufacturers have listed 242 buckets in con-



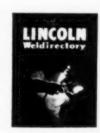
solidated table according to rated capacity ranging from $\frac{1}{3}$ to $\frac{41}{2}$ cu.yd. This table ords service classification each bucket, lists dimenrecords sions and physical data, and gives in many instances, approximate cubic feet performance on different classes of material. Contains summary

ance on different classes of material. Contains summary of popular sizes in seven types of lever arm buckets: rehandling, wide rehandling barge type, general purpose, hard digging, round nose hard digging, square nose dredging and round nose dredging buckets. Lists pertinent bucket details and also reveals general performance in cubic yards of payload on various materials. Includes explanation of three principles of multiplying power in a bucket, definitions of bucket capacities and a discussion on how to select a clamshell bucket. Useful data on counterweights, equalizer bars and Useful data on counterweights, equalizer bars and bucket teeth. Illustrated job stories and step-by-step picturization of foundation digging for houses.

INDUSTRIAL PUMPS — American Manganese Steel Division. American Brake Shoe & Foundry Co., Chicago, Ill. (24 pp. illustrated). Describes and illustrates complete line of horizontal and vertical shaft centrifugal pumps from $\frac{3}{4}$ to 6 in. in size for pumping all but clear, inactive liquids. With each type of pump is presented table showing discharge size dimensions in inches, approximate weights and capacities. Several pages are devoted to graphs showing operating characteristic curves applying only to new pumps handling clear cold water or other liquid of approximately equal viscosity and specific gravity.

DIESEL ENGINES FOR TRUCKS — Chrysler Corp. (Dodge Division) Detroit, Mich. (23 pp., illustrated.) Completely revised and containing graphic new illustrations, 1940 edition of "Dodge and Diesel" explains operating principles of gasoline and diesel engines and suggests ways of attaining greater efficiency and economy in operation of heavy-duty trucks. A sharp increase in power and torque ration of current production Dodge diesel engines is to trucks. A sharp increase in power and torque rating of current production Dodge diesel engines is recorded. Brake horsepower at governed speed of 2,600 r.p.m. has been increased from 95 to 100 and torque from 226 to 240 ft./lb. at 1,200 to 1,300 r.p.m. These power increases, it is said, are due to improvements and advancements in minute details of combustion and fuel injection. Written by engineers in collaboration with sales executives, booklet is devoted to an explanation of diesel engines in centeral and Dodge job-rated diesel in particular general and Dodge job-rated diesel in particular. Technical points of diesel design and construction are described in simple language easily understood by the layman.

WELDING DIRECTORY—The Lincoln Electric Co., Cleveland, Ohio (58 pp., 8½x11 in., illustrated). Gives complete procedures for: flat, vertical or overhead welding, for single or multiple pass welding, for poor fit-up, and for flat welding of fillet welds of mild steel; for flat welding of deep-groove joints and for general welding of high tensile steels; welding of light-gage steel, various stainless and chrome steels, chromium molybdenum, nickel chrome alloys, high mangachrome alloys, high manga-nese steel, cast iron, alumi-num, bronze, brass and copper,



for surfacing to produce mod-erate shock- and abrasion-resisting welds; rolling or sliding abrasion resisting welds; and for making tool steel cutting edges on ordinary steel and rebuilding worn tools and dies. Procedures include: recommended current ranges Procedures include: recommended current ranges and arc voltages; suggestions regarding arc length, polarity of welding current, distance to hold electrode from work, cleaning beads, welding up and down, use of wide and narrow beads, peening to increase hardness, quenching and weaving the electrode. Chart shows how to select electrodes for various jobs. Information and pointers on proper use of shielded arc welding. Includes illustrations and descriptions of arc-welding accessories. and descriptions of arc-welding accessories.



ber, joists, roof sheathing and all sawing jobs . . . because it saws faster, easier, deeper! You can handle more jobs this year because SKILSAW does more work. You will get more jobs because SKILSAW helps you bid lower . . . profitably!

SKILSAW is lighter, more compact, better balanced . . . designed and built for long years of trouble-free operation . . . gives you more for vour money!

> 9 POWERFUL MODELS — for wood, metal, stone, tile and compositions - PNEUMATIC SKILSAW - 12 IN. AIR SAW

SKILSAW DRILLS

are better for deep wood boring and all drilling!

SKILSAW DRILLS have that extra power you need for faster, easier drilling on toughest jobs. Excellent for boring holes up to 2 in. and as deep as 18 in. in hardwood. They are preferred on projects of every kind . . . in truss-roof, mine, bridge and dock construction, on dam superstructures, etc. SKILSAW DRILLS produce more work per hour . . . yet they cost no more . . . and operate for less!

22 POWERFUL MODELS - a size for every need

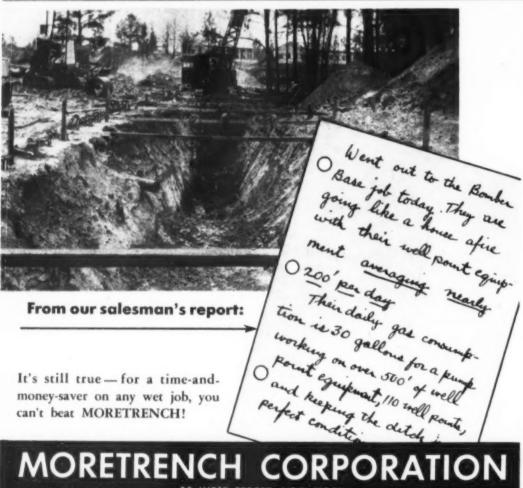
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WAREHOUSES: JOILET, ILL - NEW ORLEANS, LA

HOW TO CHOOSE A SLIDE RULE—**Keuffel & Esser**Co., Hoboken, N. J. (24 pp., illustrated.) Humorous publication by Don Herold explains in salty language difference between various types of slide rules available. Although written primarily for students in engineering colleges, this booklet contains slide rule information of interest to engineers and contractors. Describes operation of Manheim adjustable slide rule with engine divided graduations on permanent white facings. Other rules include the polyphase, the polyphase duplex trig, the log log duplex trig and the log log duplex vector.

A.B.C.'S OF PLASTERING—Gypsum Association. 211 West Wacker Drive, Chicago, Ill. (15 pp., illustrated.) A manual designed to aid in producing good plastering through good workmanship and proper mixing of satisfactory materials. The booklet states minimum requirements and points out what happens when fundamental requirements are ignored. Main requisites for satisfactory plastering job are thickness, quality of sand, quantity of sand, workmanship and ventilation. Helpful hints on machine and hand mixing, dry-outs, sweat-outs and troweled finishes.

TRANSMISSION BELTS—Hewitt Rubber Corp.. Bulfalo, N. Y. (4-p. bulletin, illustrated). Describes and illustrates various types of transmission belts for heavy-duty drive, for service in machine shops and metal working plants and for normal and light industrial services on main or auxiliary drives. Presents tables listing horsepower per inch of width, arc of contact in degrees for two pulley open drives, belt speeds in feet per minute for various pulley diameters and shaft speeds, and table showing horsepower correction factors and rubber belting price list. Gives points to be considered when ordering transmission belts and method of figuring take-up for endless belts.

FORT DEVENS CONSTRUCTION Employs 14,000 Men

(Continued from page 45)

ing machinery in a large mill where material used in barracks and other building construction is cut up and prepared on a mass production basis for erection, operating ventilating fans in barracks and elsewhere, interior and exterior lighting. A central batching plant for concrete production and smaller shop facilities for special materials, such as concrete caps for supporting heater discharge stacks, have been provided.

Material for construction purposes is delivered by rail and truck to receiving areas from which it is trucked to major centers of building activity. Lumber requiring processing is trucked to a mill equipped with electric-powered saws, fed through this plant as far as possible without reversal of direction, delivered to trucks at the farther end of the building and thence distributed in the form of finished material or parts to various centers of activity. Empty trucks are routed by traffic signs to a central area from which units are dispatched as required. Rooters for breaking frozen ground, post-hole diggers, bulldozers, power shovels, rubber-

(Continued on page 102)

PLANT: ROCKAWAY, NEW JERSEY



NEW STANDARD IN PORTABLE COMPRESSORS

A Startling New Development full of

MONEY-SAVING FEATURES

The MOBIL-AIR has a Convertible Engine . . . You can change from oil to gasoline operation (or from gasoline to oil) by a simple substitution of fuel accessories . . . in your own shop . . . no changing

of engines or engine heads or pistons. The engine has overhead valves, replaceable cylinder liners, nonsticking piston rings and other refinements.

As a Gasoline Engine this outstanding new development requires much less fuel . . . particularly at light

As an Oil Engine it is the well-known Ingersoll-Rand Type H . . . smooth running, easy to maintain, easy to start.

DRILL-MORE Multi-speed Regulator (patented) adjusts the engine speed to the use of air . . . practically eliminates wasteful "idling." The average working speed of the engine and compressor is reduced . . . more efficient operation . . . less wear.

More Work from Air Tools . . . Jackhamers and similar air tools drill up to 15% faster when the compressor is equipped with the DRILL-MORE Regulator. Remarkable Fuel Economy . . . up to 40% less fuel to do an average job. The new Two-Stage Air-Cooled Compressor, the new High-Economy engine, and the new DRILL-MORE regulator result in 15% more air per gallon of gasoline at full load-83% more at half load.

New-Type Clutch has automatic take-up . . . no sliding splines . . . easy to inspect and reface.

New Instrument Panel, Grouped Controls and many other distinctive features.

Lighter in Weight . . . Easier to Handle . . . 15 to 33% less weight than previous models.

New Mountings . . . Both the 105- and 160- cu ft sizes are now available in the 2-wheel deluxe trailer mounting . . . the 210- and 315- cu ft sizes have a new spring mounting with automotive steering as standard.

Ask our representative for details . . . let him show you the many other points of superiority.

A Complete Line of Two-Stage Air-Cooled Portable Compressor Sines 60 to 500 cfm (actual free-air delivery)

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Branches or Distributors in Principal cities the world over.

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An All-Wheel-Drive TRUCK -you can AFFORD to Buy, and CAN'T AFFORD to be without!

If you have a job where two driving wheels are not enough—and you can't afford or use a big All-W beel-Drive truck—get a demonstration of a Marmon-Herrington All-W beel-Drive converted Ford!

You'll be amazed how much bigger loads you can haul through loose sand, gravel, mud, dirt or snow. You'll be surprised with the number of extra trips you will make in a day. You'll be astonished at the ability of these vehicles to climb out of pits and dumps, to travel with greater safety on slippery highways, to operate under-body graders or to push snow plows through heavy drifts.

And best of all-you'll be surprised at the startlingly low price and operating cost, as

compared to any other All-W beel-Drive vehicles on the market.

For Marmon-Herrington All-Wheel-Drive converted Fords have all the inherent virtues and advantages of standard Fords-plus power and traction applied through all four or all six wheels. The result is more effective power, greater ability and greater economy of operation than you would ever believe. They incorporate the same outstanding features of design and construction which are found in Marmon-Herrington Heavy-Duty All-Wheel-Drive Trucks, built in the same plant by the same workmen.

Write for literature showing these vehicles in action, and the name of the nearest Marmon-Herrington dealer. Cable address MARTON.

MARMON-HERRINGTON CO., INC.
INDIANAPOLIS, INDIANA, U. S. A.

(Continued from page 100)

tired wagons, and portable concrete mixers were extensively employed, and 4 to 6 in. of marsh hay was widely used to aid in curing concrete poured in sub-freezing weather.

Wood-Working Mill

A straight-line production system is employed in the wood mill. Four 5-hp. DeWalt motor-driven saw machines in line are used to pre-cut members requiring four operations. The machines are set to perform one operation each.

The stock enters the building through an opening at the beginning of the "cutting line", and pauses only for the few seconds required for each machine to perform its pre-arranged task. With four machines, four operators and six laborers, 300 2x6-in.x20-ft. barracks rafters are completed, ready for erection, per hour. Other "4-operation" members are cut with equal efficiency. A time study revealed that the production of these rafters was six per hour, and to match the straightline machine method would require the services of 50 mechanics, as compared with 4 mechanics and 6 laborers. The savings per hour at the prevailing wage scale, it is claimed, total \$53.

An additional time study on a twomachine line in the cutting of stair stringers showed a production of fifteen 14-riser and 15-tread stringers per hour, requiring two operators and no laborers. Previous to the installation of this method of cutting, the production of these stringers was 1 stringer per hour, per man. Savings per hour over hand methods were \$16.25.

The use of electrical equipment in this manner greatly minimizes stock handling, eliminates layout work and assures greater accuracy through the absence of the human element. There have been no delays to production due to electrical or mechanical failures. The machines have been operating 24 hr. per day. There are 46 different wood members which are precut on these production lines, besides numerous accessories such as mail boxes, coal boxes, ventilators, screens, ladders, etc. Thirteen machines keep many thousands of carpenters busy positioning and nailing these members in place. Centralized control under one man at the mill insures uniformity of production not attainable with hundreds of individual mechanics working at separated sites of erection.

Barracks Design

The barracks unit, designed by the U. S. Army for general cantonment service, comprises 358 of the buildings at Fort Devens. Each standard barracks building is a 2-story frame structure 80 ft. longx29 ft. 6 in. wide, 25 ft. high from grade to top of ridge, and accommodates 63 men, including 55 privates and 8 non-commissioned officers. On the ground floor are toilet and lavatory facilities, with a heater room and bin for anthracite buckwheat coal. Heating is by warm air forced through overhead ducts by 30-in. motor-

(Continued on page 104)



HARD, WET CLAY SILT SILT Jouget Alexad!



NEW — Adams Power Control Unit Adaptable to any tractor and will handle any scraper up to 15 cu. yds. Entirely different... has a lot of new operating advantages. Ask your Adams representative about it.

Does IT LOAD EASILY ... QUICKLY ... AND FULL?

That's your first concern about a hauling scraper. Their ability to get good pay loads in all types of material is the first thing you are going to like about Adams Hauling Scrapers. Their easy loading ability is due first, to a drop-center bowl which penetrates the ground quickly; second, to balanced distribution of material while loading; and, third, to the shape of the bowl into which material does not have to be pushed back as far or lifted as high to get capacity—two factors which consume time and power with other scrapers. . . .

Also, you'll like the high clearance of the bowl in hauling position, the balanced weight of the load which rides on four big tires that do not cut into soft fills and the ease with which the material is dumped or spread without slowing down the tractor.

Adams Hauling Scrapers are available in 11³4, 5¹4 and 3¹4 yard sizes. Let your local Adams representative arrange to demonstrate one to your satisfaction on your job.

J. D. ADAMS COMPANY . . . INDIANAPOLIS, INDIANA
Sales and Service Throughout the World

ADAMS Hawling Scrapers

ar !

Haul 10ft.

LOADS and



Return Quickly

with 8#. TRAILER

ROGERS swinging side brackets permit you to haul the occasional extra wide load on a trailer that

normally complies with legal limits as to width. Trailers with capacities as large as 60 tons are available so equipped.



220 ORCHARD STREET

ROGERS





A foremost contractor (owner of the paver shown above) writes "This machine is fast and very efficient"—"We heartily endorse this paver".

This letter is in our files. Get all the facts on this up-to-theminute paver. Modern from boom-tip to skip...efficient and built to last.



RANSOME CONCRETE MACHINERY COMPANY
DUNELLEN, NEW JERSEY

(Continued from page 102)

driven fan units. A continuous hood is provided above the first floor windows to permit proper ventilation in bad weather. At each end of the unit is a platform and ladder for emergency use; inside stairways providing communication between floors. Barracks units are lighted electrically and are distributed in battalion and regimental groups with the necessary auxiliary buildings. Each company has a recreation building (there are to be 111 of these, one story, and about 45x25 ft.), and the fort will have two theaters, service clubs, administrative buildings and many other facilities.

The basic construction of the barracks units consists of concrete piers with three 2 ft.x10-in. built-up girders and wooden joists resting on top of these. Anti-termite metal barrier construction protects these structures. The first floors are double-insulated with 1/2-in. insulation board and a 1/2-in, air space. Double boarding is used on the second floors. Windows are weightless. Production in the wood mill, which is fully equipped with DeWalt 5-hp. portable motor-driven saws, includes the complete manufacture of ladders, stairway stringers, ceiling ventilating screen assemblies, coal boxes, shower benches, canopy brackets, rafters, as well as chamfering, balcony work and many other building parts.

The hospitals are heated by steam from a boiler plant adjacent to these buildings, steam lines being carried on saddles below the runways connecting the various ward sections, and close to the ground for increased accessibility both for construction and maintenance.

Erection of barracks frames after fabrication on the floor was tried out, but this did not work satisfactorily on account of the length of structure involved. In some shorter buildings this method was utilized satisfactorily. In general, the light character of the materials required in the frame structures of the camp facilitated rapid handling by labor, skilled and unskilled. Great speed of production was attained by concentration of workmen of required trade specialties on each local job. Prepared roofing was used widely, and outside insulation as well. An example of the speed of production attained is afforded by the work accomplished at the reception center for recruits, involving ten barracks, each 80 ft.x29 ft. 6 in.:

STARTED, 1940 FINISHED, 1940

Foundations	Nov. 8	Nov. 11
Superstructure	Nov. 14	Nov. 20
Plumbing	Nov. 14	Dec. 3
Finish outside	Nov. 18	Nov. 24
Electric wiring	Nov. 20	Dec. 5
Finish inside	Nov. 21	Nov. 24
Heating	Nov. 23	*
Painting	Dec. 13	*

*This reception center was available for recruits approximately Dec. 6.

Bridge at Fort Devens

The bridge had to be built across the Nashua River to connect the station hospital with the principal part of the cantonment. It consists of three spans of second-hand I-beams on four concrete piers resting on ledge, with wood pile approach-

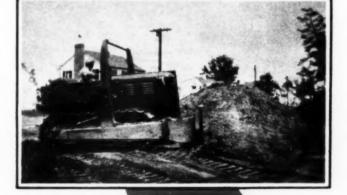
(Continued on page 106)



Baker Equipment is there when ground is broken on big defense projects. It's *there* when you've got a huge job to do in a few precious hours.

Baker Hydraulic Bulldozers and Gradebuilders can be depended upon to perform smoothly and deliver in emergencies. Easy control, balanced hydraulic system, simple direct lift and great stamina fit them for the toughest jobs.

For earth moving, use Baker Hydraulic Scrapers with their easy loading features which speed up grading jobs. Baker Road Rooters tear up old roads and tough spots. Baker Road Maintainers and Road Discs keep highways near defense projects in shape and Baker Snow Plows keep them clear in winter. Bakers are always ready when you need them — never A.W.O.L!



THE BAKER MFG. CO.

568 Stanford Ave.

Springfield, Illinois



• Write or Wire for Latest Bulletins

BULLDOZERS, GRADEBUILDERS ROAD ROOTERS, SCRAPERS ROAD DISCS, MAINTAINERS SNOW MOVING EQUIPMENT



Primacord will save you money. This lightweight, waterproof, flexible detonating fuse acts as the detonating agent for each cartridge in the drill hole, and connects all holes. One fuse and cap or electric blasting cap attached to the end of the main line detonates the entire blast. Because of the special construction of Primacord, it is possible to detonate holes placed at very close intervals, without danger of cutoffs. Write for the Primacord book.



PRIMACORD BICKFORD

IMPORTANT

Branch lines should load away from main lines at right angles. Avoid kinks and small

Detonating Fuse
THE ENSIGN-BICKFORD CO. - SIMSBURY, CONN.
Makers of Cordona-Bickford Detonating Fuse - and Safety Fuse since 1836

(Continued from page 104)

es. The pile approaches are 61 ft. 6 in. and 301 ft. 6 in. long respectively and the 1-beam spans are 38 ft. 2 in., 50 ft. 2 in. and 38 ft. 2 in. The type of structure adopted was determined from availability of material and considerations of speed. As the bridge is used to transport contractors' equipment it was designed to carry a 50-ton crawler crane with treads 8 ft. on centers.

The foundations in the river were made by filling in the river for half its width to a point above the water-level and building cofferdams of sheet piling in the fill down to ledge. After the first two piers were above water the filling was removed, the other half of the river filled and the process repeated.

Roadway width is 22 ft. with a 5-ft. walk. The bridge carries a 12-in. sewer line under the walk and a 12-in. water main under the floor.

The flooring is of hurricane hardwood 3 in. thick. Four 14x14-in. sticks under the roadway are used to carry the heavy crane, with 4-x12's interspersed for ordinary highway loads. The steel spans consist of ten lines of 24-in. 74-lb. wideflanged beams doubled under the crawler tracks.

The pile bents for the approaches consist of 6 spruce piles per bent, with two batter piles. Caps are 12x12 in. Bents are 15 ft. on centers.

MAINTAINING 100,000 MILES OF National Forest Roads

(Continued from page 53)

timber stands of the northwest, narrowgage tractor trail-builders have been developed. As a result narrow trails adequate for quick travel of narrow-gage equipment can be built and maintained at low cost where standard roads would be prohibitive.

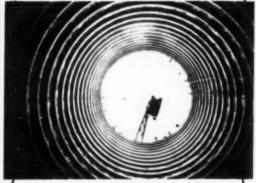
Where heavy recreational and other travel use by the public demands high standard roads trailbuilders, rippers, graders, power shovels, earth movers and sheepsfoot rollers are handling more economically than ever before the heavy yardage that is inevitable in the mountains. The advantages gained through use of new equipment are being put into more miles, higher standards, and improved roadsides. By revegetating road banks on stabilized slopes and protecting trees from damage during construction, future maintenance costs are being cut.

To many cooperating agencies goes the credit for maintaining this far-flung road system. Not only the Forest Service but also the counties, state highway departments and the Public Roads Administra-



GIVES YOU EASIER, FASTER, AND SAFER CONSTRUCTION ON...

...SUBWAY TUNNELS
AND SHAFTS!



• Here's an example of COMMERCIAL Plate useability... the photograph above illustrates a shaft on the Chicago Subway System, lined with I beam and flanger and corrugated plates-by COMMERCIAL. Notice the neat, clean appearance of the shaft... and don't overlook the ease, speed and safety COMMERCIAL Plates brought to this job. For an idea of what you can expect from COMMERCIAL... any size liner plate to fit any size tunnel... an efficient, time saving system of tunnel lining... and an all-around money saving method on all of your tunneling jobs. A letter to us listing your requirements will bring an immediate response... write!

The COMMERCIAL SHEARING & STAMPING CO.

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JOINT
INSTALLING
MACHINES

FLEXIBLE
ROAD JOINT
MACHINE CO.
WARREN OHIO

Page 106—CONSTRUCTION METHODS—March 1941

tion all play a very important part; so do local communities and private users, such as lumber companies, many of whom have right-of-way permits stipulating that the road be kept up by the permittee.

Full Speed Ahead ON NAVAL AIR STATION PROJECT

(Continued from page 64)

bulkheads, bridges, roads, ramps and paving. All of this work is subdivided into units, each under a separate superintendent. The assistant project manager, R. C. Biener, not only acts in this capacity but also is in direct charge of building construction. Under him, handling building construction, are coordinators, follow-up men and estimators in the office and superintendents in the field; the buildings are divided into groups, with a superintendent for each group.

Likewise divided into these groups is work carried on under the direction of J. T. White, who is engineer in charge and general superintendent of all mechanical facilities, plumbing, heating and outside utilities. Under this department also are the extensions of the power plant, heating, electrical and water systems, as well as temporary construction utilities, such as

water and lights.

Standard Navy buildings such as permanent and temporary barracks, warehouses and hangars are being built from plans already available in the Bureau of Yards and Docks. Plans for special structures, for waterfront development and for the airfield are made on the site by the engineers and architects, Giffels & Vallet, Inc., of Detroit which maintains a force of about 50 men in its department in the project office building. With the cooperation of the Portland Cement Assoc., the runways and parking areas were designed by the Navy Engineers.

Progress Schedule

Work on bulkheads, dredging, preparation of the landing field and the permanent barracks building started late in August. Other structures and paving of runways got under way within 30 to 60 days thereafter. A large part of the new area had been developed as a camp in World War days, and the contractor had first to clear the area of streets, roads, woods and an abandoned powerhouse with two tall smokestacks.

A 15-month schedule, allowed for the project, would call for completion late in 1941. Portions of the job are approaching completion today, and it appears certain

(Continued on page 108)





No. 10-A TILTING TABLE, PORTABLE SAW RIG WITH BAND SAW AND JOINTING ATTACHMENTS

This saw rig is especially adapted for cross-cutting, ripping, dadoing, beveling and other operations which pertain to general contracting work. The tilting table makes it possible to cut any type of plain or compound mitres.

The 12" Band Saw attachment is furnished complete with tilting table and ripping gauge. The Jointing attachment is of heavy duty type with 6", three knife cylindrical head, adjustable tilting gauge, and aluminum guard. Each attachment is driven by a ball bearing drive shaft so designed that the proper operating speed of each unit is maintained.

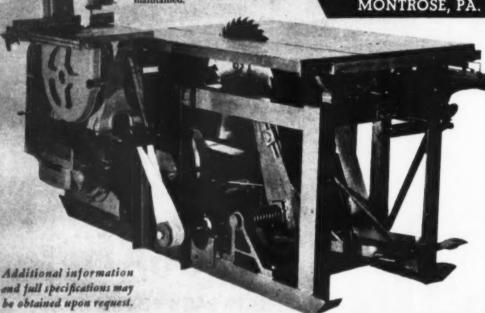
BEACH MFG. CO.

MONTROSE PA

MONTROSE, PA.

PLANT

A complete unit—rapidly set up, in-



Either way-ma CRUSHING



PORTABLE with **V-BELT DRIVE**

Whether you use this Reliance Portable Crusher alone or in combinawhether you use this Keliance Port-able Crusher alone or in combina-tion with an Elevator, Chute Screen, etc., you can get no better value for your money in terms of capacity, low operating cost and rugged durability. The Reliance Crusher is famous for its strength and simplicity. It is particularly stable. A "swell" buy for crushing on any job. Send for detailed circular.



PRODUCTS:

Reliance offers a complete line of Rock Crushers; Bucket Elevators; Revolving Screens; Storage Bins; Pulverisers; Chip Spreaders; Heating Kettles; Bin Gates; Feeders; Belt Conveyors; Grizzlies; Air Separators; Sand and Gravel Spreaders; Wash Boxes.

UNIVERSAL ROAD MACHINERY COMPANY KINGSTON, N. Y., U. S. A.

DISTRIBUTORS in ALL PRINCIPAL CITIES of U.S.A

(Continued from page 107)

that the efforts of those in charge will effect a saving of several months in the allotted time.

Dredging

Fill material consisting principally of sand and clay is being dredged offshore at places designated by the Bureau of Yards and Docks by the 27-in. dredge, Pennsylvania, of the American Dredging Co. and the 16-in. dredge Northwood of the Atkinson Dredging Co. To put the dredging operation entirely under the control of the general contractor the dredges are rented on an hourly and not on a yardage basis. Pumping through 27-in. line up to 7,000 ft. long the larger dredge puts about 1,-000,000 cu.yd. per month into the fill. On miscellaneous clean-up work in which it is engaged, the smaller dredge delivers about 300,000 cu.yd. per month.

Short sloughs branching off the main creeks are filled by starting at the inner end and forcing a roll of marsh mud ahead of the dredged material until the fill reaches the permanent waterfront line.

Long Culvert

One of the largest low areas to be filled by the dredges was Boush Creek. Before starting the fill in this area, the plans called for the relocation of Boush Creek in a culvert 4,200 ft. long made up of two box-sections totaling about 2,300 ft. and two open-sections for the remaining 1,900 ft. Typical box-sections are shown by accompanying photographs of reinforcedconcrete culvert, about 1,700 ft. long, and steel-walled culvert, almost 600 ft. in length. Similar steel-walled channel, without the roof to support cover material, was constructed for 1,100 ft. and a concretefloored ditch (without sidewalls) for 800

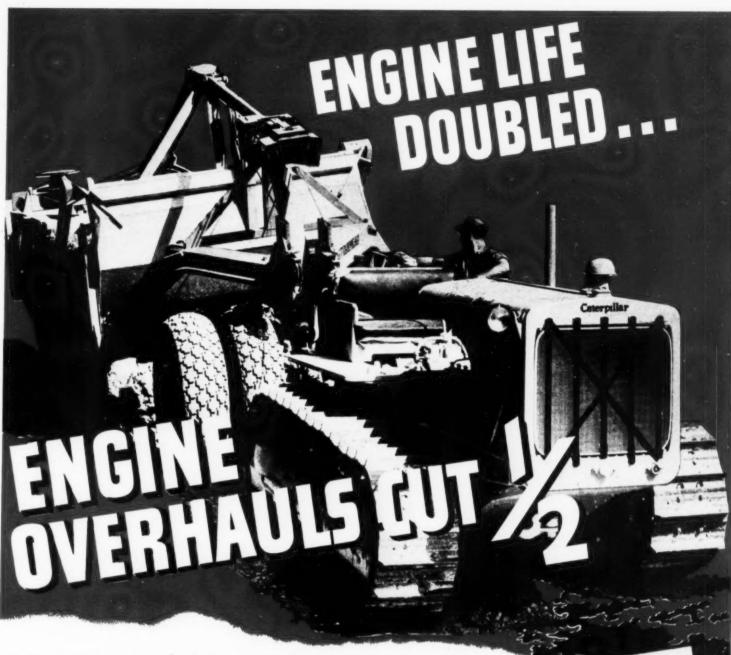
Well-points speeded the construction of reinforced-concrete culvert and other structures where dry excavation below groundwater level was desired. With the aid of well-points the contractor completed 1,500 ft. of 6x12-ft. reinforced-concrete culvert through sand-clay soil in 4 weeks. Three complete Moretrench systems, each consisting of 100 well-points and necessary pumps, have been used repeatedly on the job.

Dry Fill

Airfield runway grades range from minimum El. 10.8 to maximum El. 14.9. Practically the entire area of runways, taxiways, and aprons is in cut or on dry fill. Additional sandy loam for fill was obtained by cutting below grade in borrow pits in intermediate areas and backfilling the pits with dredged materials.

A fleet of ten tractor-drawn scrapers of 15-yd. heaped capacity worked in squads of three with four pusher-tractors to assist the four squads in loading. The fleet comprised nine Caterpillar D8 96-hp. diesel and Le Tourneau Model F units and three Allis-Chalmers HD14 108-hp. diesel and Gar Wood Model 515 combinations. For pushing, the contractor operated four additional high-speed HD14's, which maneuvered quickly in the pits. The squad

(Continued on page 110)



Here's the story straight from Mr. George Langenfelder of C. J. Langenfelder and Son, prominent Baltimore Contractors:

"Prior to the use of RPM DELO we overhauled all our Diesel engines after 2500 to 3000 hours of service ... Since using your RPM DELO our engine life expectancy is over 6000 hours! To us this means 100% longer engine life and reduction by one-half of our engine overhauls. By experience, by cold facts, we attribute our results to RPM DELO.

"We recently completed a job on the Pennsylvania Turnpike involving the moving of nearly 2,000,000 yards of rock, shale and dirt. Our contract called for completion in 270 calendar days; if we ran over, heavy penalties were imposed. Our insurance against time loss was 100% use of RPM DELO, so we finished ahead of schedule.

"We own and operate 28 Caterpillar Diesels... 3 Waukesha-Hesselman engines... 4 Mack-Lanova Diesels... 9 Cummins Diesels... 44 units, which to us represent 44 reasons why we use RPM DELO exclusively!"

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Approved by the makers of over 95% of the installed Diesel horsepower in America, RPM DELO is marketed under the following names:

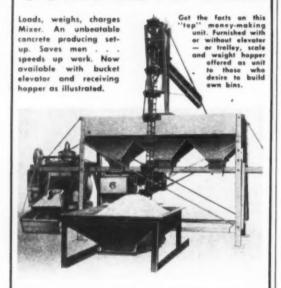
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Ask your Diesel engine manufacturer or distributor for the RPM DELO supplier in your locality.

STANDARD OIL COMPANY OF CALIFORNIA

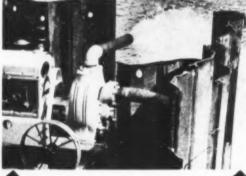


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DUAL PRIME PUMPS!



Big 40-M CMC pumping 40,000 G.P.H. on bridge job. A standout pump for all around service.

Doubly fast — doubly sure. Only CMC has dual prime. Sizes up to 10" — unbeatable in performance, stamina, dependability.

GET THE LATEST CMC CATALOG!

See what's new and better in Concrete Mixers, Hoe-Type Mixers, Batching Equipment, Pumps, Hoists, Power Saws, Carts, Barrows!

CONSTRUCTION MACHINERY CO.

Waterloo, Iowa

(Continued from page 108)

system was adjusted as required to meet special conditions.

On one afternoon, four Model F scrapers and three Model 515 units were observed hauling an average estimated one-way distance of 2,000 ft., mostly over fresh level fill and some soft, rain-soaked grade, from one borrow pit, where the entire scraper contingent was served for the time being by a single pusher. All the Allis-Chalmers tractors were equipped with pusher plates which enabled two units to load in tandem with the pusher-tractor behind the rear scraper, when more than one of these tractor-scraper units happened to return to the pit simultaneously.

When pushing in tandem, two scrapers were loaded in about 70 sec. About 15 sec. ordinarily was required on each loading operation for the pusher-tractor to make contact at the rear of the scraper. Total loading time for single scrapers, from the moment the cutting edge was lowered until it was raised, varied from 30 to 70 sec. and averaged about 50-55 sec. in the wet sand-clay of the borrow pit. The best observed dumping time was 14 sec., which seemed exceptional. An average of straight dumping times, with no sticking in soft grade, was apparently about 30 sec. Total round trip times (full cycle) for the vario s units ranged from 13 to 15 min., which vould give four trips for a 60-min. hour but only 3.4 trips for the 50-min. hour commonly used in conservative estimating.

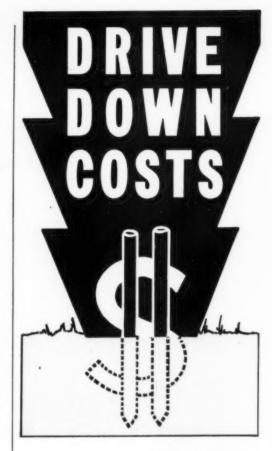
Concrete Plant

For economy in materials handling, the general contractor set up batch plants at a waterside vard of the Southern Materials Corp., about 2 mi. from the project, where sand, gravel and cement could be brought in by barges. Concrete for foundations, structures and some highway paving in the new area is delivered from one of these batch plants by Southern's truck mixers, rented on an hourly basis, as required. Most of the units are 5-yd. Rex Moto-Mixers on dual-rear-axle Macks hauling 41/2-yd. batches, although some Blaw-Knox 3-yd. mixers are used on four-wheeled trucks to back into tight places. The daily concrete fleet varies in size from 13 to 30

For construction of reinforced-concrete buildings, such as the 1,000-man barracks, the contractor has employed a portable paving mixer, with hoist tower attached. Dry batches are delivered to this unit from one of the wharf plants by dump trucks. Batching of 34E paving mixers on runway construction started from a trackside plant set up on a railroad spur inside the new area, but this batching has now been shifted to the wharf.

Equipment

Purchases of new equipment to rush construction of the air station at required speed are estimated to total \$650,000. This equipment is in addition to a vast amount of rental equipment, which probably has a replacement value (exclusive of the two



as you drive in those piles with

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PILE HAMMERS 18C, 30C, 50C and 80C

In pile driving—the first big step in construction—it is easily possible for you to begin important cost savings. Plus this, you keep your construction up to schedule as far as the pile driving is concerned—you get a faster start on the construction operations that follow. With the Super Vulcan you get twice the blows per minute—more piles driven per dollar—less steam used. These Pile Hammers have rugged strength—are of simple design—have positive action—are easy to operate—are durable, and fit the same leads and use the same accessories as the Vulcan Single-Acting Pile Hammers.

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Sizes 18C-30C-50C-80C meet all needs

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Illinois

dredges) equal to that of the newly purchased units.

Construction of the air station and facilities by the Virginia Engineering Co. is by cost-plus-a-fixed-fee contract which stipulates exactly the amount of the contractor's fee (or profit) regardless of the final cost of the project. Original estimated value of the work was between \$13,000,000 and \$14,000,000, but later change orders increased the value to \$17,000,000 with a negotiated increase in the contractor's fee. Salaries of administrative personnel on the project are part of the cost of construction and are not deductible from the contractor's fee.

Purchases of new equipment likewise are charged to the project and are paid for by the Navy, which takes title at the time of purchase, although the contractor is not reimbursed until the close of the estimate period in which the purchase is made. Approval of the contracting officer for the Navy (the officer in charge on the project) must be given before each purchase is made.

Electric Equipment AT GREEN MOUNTAIN DAM

(Continued from page 48)

shovels being used on the job, becomes caked with ice each night, and much of this ice thaws each morning. The cable is constantly being subjected to the abuse of knife-edged rocks as it is pulled from place to place to follow the shovels. Yet it continues to form a vital link in the dam construction work. Abuse from Mother Nature, however is not new to this particular cable. Part of it lay at the bottom of the Mississippi River for five years supplying power to another project before it was brought to the Green Mountain job.

Electric motors in use at the Green Mountain damsite undergo a real test. They drive the Gardner-Denver compressors which furnish air for drilling purposes. They power the electric shovels. And they drive the pumps which remove seepage water from the base of the dam. These G-E pump motors, though almost constantly incrusted with ice and snow and subjected to sub-zero temperatures, continue to function.

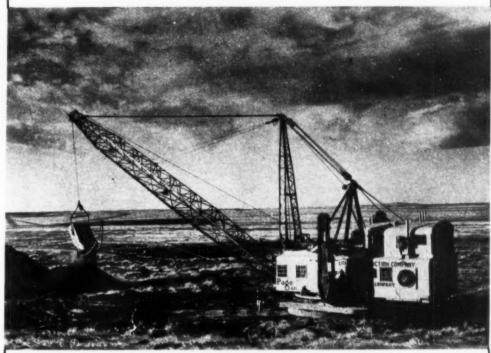
At night, batteries of floodlights above the dam light the damsite to daylight brightness so that night shifts may accomplish as much as day workers.

To screen the material placed in the cofferdam the Warner Construction Co. is using a recently devised movable gravel plant, entirely electrically equipped, hav-

(Continued on page 112)

PAGE TWO-ENGINE DIESEL-POWERED WALKING DRAGLINE

One engine for loading and hoisting Another separate engine for swinging



On canal work near Tucumcari, New Mexico, Utah Construction Company and Griffith Company use this Page Walker, powered by two Page horizontal Diesels, one mounted above the other. A heavy-duty 6½-cubic-yard Page Bucket is used on a 110-foot boom.

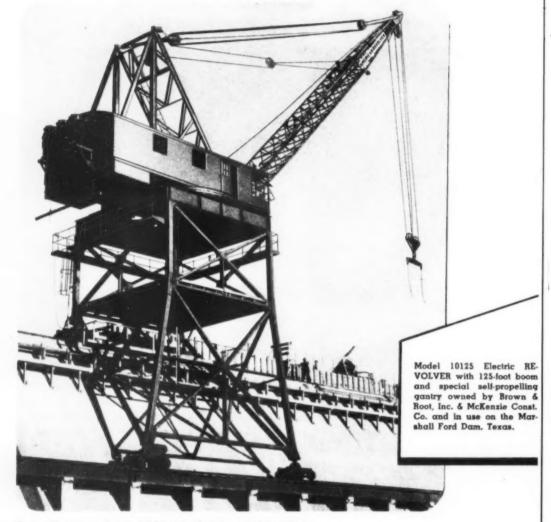
Here is a new development in large draglines—fast hoist and fast swing at the same time! No longer need the operator delay the swing of the machine waiting for the hoisting of the bucket. Rather, with the balanced power of the Page Two-Engine Walker, acceleration of hoisting and swinging is greatly increased.

To understand this faster operation with a Page Two-Engine Walker, visualize using all of the power of your present dragline for hoisting only, without swinging the machine. You will find that the hoisting speed will be increased greatly. Now consider a second independent engine for swinging only. This second engine accelerates the swing in proportion to the faster hoist. The two engines—the large Diesel, which only hoists and loads the bucket, and the smaller independent Diesel for swinging as rapidly as the faster hoist demands—furnish perfectly balanced power and increase the number of loaded buckets that can be handled per minute. Learn what a Page Two-Engine Walker will do on your dragline job.

PAGE ENGINEERING COMPANY

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Equal to the LARGEST CONSTRUCTION JOBS . . . yet as nimble as a goat



For all operations of large dam construction:

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- 2 Pouring concrete.
- 3 Stripping forms.

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Write for CATALOG 400-R-1A

THE HANDSOME NEW BOOK WHICH "TELLS ALL" IN WORDS AND PICTURES

Page 112 CONSTRUCTION METHODS - March 1941

(Continued from page 111)

ing G-E transformers, gear motors and controls. This plant is moved from place to place over the rough terrain on large tractor treads, being fed power by several thousand feet of cable. The machine eliminates the trucking of unscreened gravel from the pit to the gravel plant.

In addition to forming a source of water supply, the Green Mountain Dam is expected to furnish more than 80,000,000 kw.-hr. of electrical energy yearly. This will be developed in one power plant immediately below the new dam. After the project is completed, the power will be used for pumping water from Granby reservoir into Shadow Mountain Lake and will also be supplied to the commercial market.

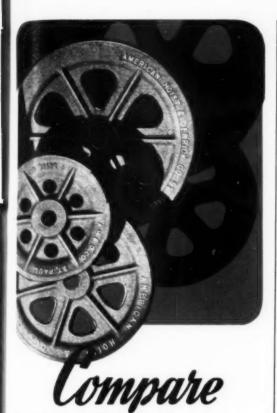
For the U. S. Bureau of Reclamation on this project, Porter J. Preston is supervising engineer and R. B. Ward, construction engineer. Operations of the Warner Construction Co. are directed by Walter N. Hill, chief engineer.

Stepped Cuts MADE THROUGH LOESS BLUFFS

(Continued from page 54)

flowing. Water flowing over sloping faces of cuts in this material causes erosion and sloughing. It was decided, therefore, to excavate the cuts, ranging up to 80-ft. depth, as a series of vertical-faced steps, or terraces, with 15-ft. wide horizontal benches or shelves at the bottom of each 15-ft. vertical lift. The surfaces of the benches were sloped away from the faces of the cut at a rate of ½ in. per foot, so as to carry rain water back to the toe of the wall along each bench and prevent it from flowing over and eroding the faces of the cuts. Longitudinally, the benches were sloped at 1 per cent grades leading to inlets on lines of 24-in. Armco corrugated pipe which drained off the water and prevented it from doing damage to the walls of the cuts.

In spite of the unusual type of stepped excavation called for on the project, all earth moving was done with standard equipment including 5 Gar Wood 20-cu.yd. capacity scrapers, 5 diesel tractors (3 Allis-Chalmers and 2 Caterpillar) 3 pusher tractors to expedite loading of the scrapers and a motor grader and a bulldozer for leveling and trimming the cuts. The procedure followed by the contractor was to start at the top and work the full width of the cut until a depth of 15 ft. had been excavated between vertical faces on each side. Leaving a 15-ft.-wide horizontal bench at each side, the process was repeated in



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ALL PRINCIPAL CITIES

2,000 cu.yd. of stone-aggregate concrete, $1:1\frac{3}{4}:3\frac{1}{2}$ proportions, went into the arches; 1,700 cu.yd. of gravel concrete, 1:2:4 mix, into the abutments and center piers; and 2,100 cu.yd., gravel concrete, 1:21/2:5 by volume, into the wing walls and the footings, which rest on bedrock. Concrete was delivered from a plant of the Colonial Sand & Stone Co. about 2 mi. distant in truck mixers, mostly of 5-vd. size, and was mixed after arrival at the site. Once winter had set in, all aggregates were heated with live steam in the bins at the plant to a temperature within a spec-

At the bridges, which skew across the

(Continued on page 114)

successive vertical lifts of 15 ft. until subgrade elevation for the roadway relocation was reached.

The grading work on this contract was done by Frank Eblen, contractor, of Cumberland, Ia., under the direction of the Iowa Highway Commission, of which Fred R. White is chief engineer, L. M. Martin, district engineer and C. C. Letner resident engineer.

* * *

SALAMANDERS AND TARPAULINS PROTECT Winter Concrete

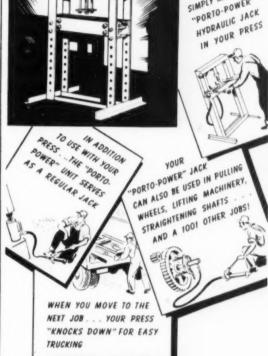
(Continued from page 66)

porary inclosures made up of tarpaulins and burlap mats on light wood frames (with 1 ft. of salt hay under tarpaulin covers on top of the arches) maintained required temperatures surrounding the concrete during the day of placement and the 5 days specified for curing thereafter, making a total of 6 days' protection in all. Minimum allowed temperature inside the inclosures was 50 deg. F., and minimum temperature of concrete when placed in the forms was specified as 60 deg. Ordinarily concrete was not allowed to be placed when the atmospheric temperature was less than 32 deg., but at the discretion of the engineer in charge at the site, placing could start in the early morning at slightly lower atmospheric temperatures, provided a temperature rise could be confidently predicted, in order to take advantage of warm weather during the day and assure complete inclosure of the freshly placed concrete in advance of any temperature drop in the evening.

Bridge Concrete

Concrete requirements for the two bridges totaled 5,800 cu.yd. Of this total ified range of 70 to 150 deg. F. to make sure that no frost remained in the sand, stone or gravel. Mixing water was heated to a temperature within the same 70-150deg. specified range.

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VALVE & COUPLING CO

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(Continued from page 113)

parkway extension from a nearby junction of the two overpassing highways, the contractor placed the concrete in the forms with three gasoline cranes (two Northwests carrying 60-ft. booms and a rented Marion with a 75-ft. boom) handling 1-yd. loads in bottom-dump buckets.

Center piers of the two bridges are in the median separating strip which divides the northbound and southbound lanes of the parkway. Spans of the four skewed arches, measured square across the openings, vary from 50 ft. 4 in. to 55 ft. 11/2 in., and the lengths of the bridges, out to out in the other direction, are 52 ft. 3 in. and 54 ft. 7 5/16 in. A center-line construction joint divides each double-arch structure into halves, and each half required about 500 cu.yd. of concrete for an arch pour across both spans. An arch pour of 500 cu.yd. (half of a bridge across two spans) took about 8 hr. Ten portable gasoline-powered vibrators were available on the job; in making one of the double-arch pours, four vibrators were set at the center pier and two at each abutment, with two spares held in reserve.

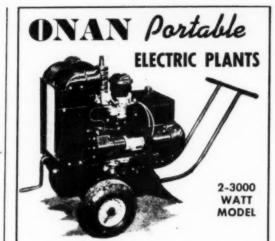
Arch Protection

Before starting an arch pour, the contractor inclosed the open ends of the arch forms and the two abutments with temporary housing, utilizing canvas tarpaulins and burlap mats as the closure material. The burlap mats consisted of two thicknesses of fabric with quilted cotton filling. From 14 to 22 coke-burning salamanders were employed during the placing and curing of the concrete, in order to have the heat within the inclosure as uniform as possible regardless of the atmospheric temperature. Two salamanders were placed within the temporary housing at each abutment, and from five to nine were distributed under each arch. For 6 days' heating of arch concrete, the salamanders consumed about 10 tons of coke. Actual temperatures inside the inclosures always exceeded the specified minimum of 50 deg. and ranged up to about 65 deg.

As concrete was placed in the arches, the exposed upper surface was screeded and blanketed with 1 ft. of salt hay covered by tarpaulins. On warm days during the curing period, the tarpaulins were removed long enough to permit wetting down the hay with a hose.

Concrete temperatures were checked by taking thermometer readings every hour during placement to make sure that the concrete temperature was above the 60deg. minimum. On the Petracca & Banko job, 29 deg. was the lowest atmospheric temperature at which the engineer in charge permitted placement of arch concrete to start. This temperature prevailed on one day at 7:00 a.m., when placing began, and the thermometer was rising. By 6:00 p.m., when the atmospheric temperature was 39 deg., all concrete had been placed and inclosed. Temperatures inside the inclosure on this day were 54 deg. at 7:00 a.m. and 60 deg. at 6:00 p.m. For concrete in units such as footings, which could be kept completely inclosed throughout the placing operation, the engineer in

(Continued on page 117)



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(Continued from page 114)

charge of the job would have permitted placement to start at atmospheric temperatures as low as 20 deg. F.

Administration

Total construction cost of the 3.9-mi. Hutchinson River Parkway Extension, exclusive of lighting and landscaping, for which contracts had not been awarded at the time these notes were written, is about \$6,400,000. The extension is expected to be open to traffic by Oct. 1, 1941.

For the Triborough Bridge Authority, which financed the improvement by sale of bonds, Robert Moses is chairman, and Madigan & Hyland are consulting engineers. The New York State Department of Public Works cooperated in the design and has full charge of construction. Arthur W. Brandt is superintendent of public works for New York State, H. O. Schermerhorn is commissioner of highways. and J. J. Darcy, Babylon, L. I., is district engineer responsible for the work on this project. At the site, Harry Simberg fills the position of project engineer in charge of all construction. The contract of Petracca & Banko, which involves a large amount of construction having a total value of about \$700,000, is under the direction of I. Finkelstein, engineer in charge for New York State, and of Charles M. Leahy, superintendent and chief engineer for the contractors.

Tall Timber Trestle BUILT OF BENTS IN 31-FT. STORIES

(Continued from page 46)

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Cooper's E-55 loading, the longitudinal force equal to the maximum exerted by a train, covering the whole structure, and a 90-mi. wind blowing laterally.

Creosote treatment was the empty-cell treatment, using a 50-50 creosote and petroleum oil. Material under 6 in. in thickness received a 10-lb. treatment and timber over 6 in. received an 8-lb. treatment.

The bridge was built for the Weyerhaeuser Timber Co. by the Hart Construction Co., Tacoma, Washington. The timber for the center 480 ft. was all preframed by Timber Structures, Inc., of Portland at the Weyerhaeuser mill at Longview. It was sent to St. Helens, Ore. to be creosoted by Pope & Talbot.

W. D. Smith of the United States Forest Service and T. K. May, West Coast Lumbermen's Association engineer, assisted in the design and layout of the bridge. The cost of the structure was 45.7c per sq. ft.

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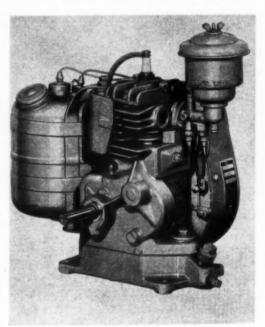
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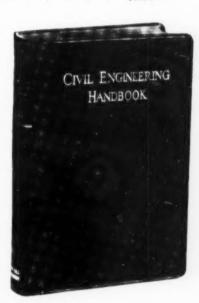
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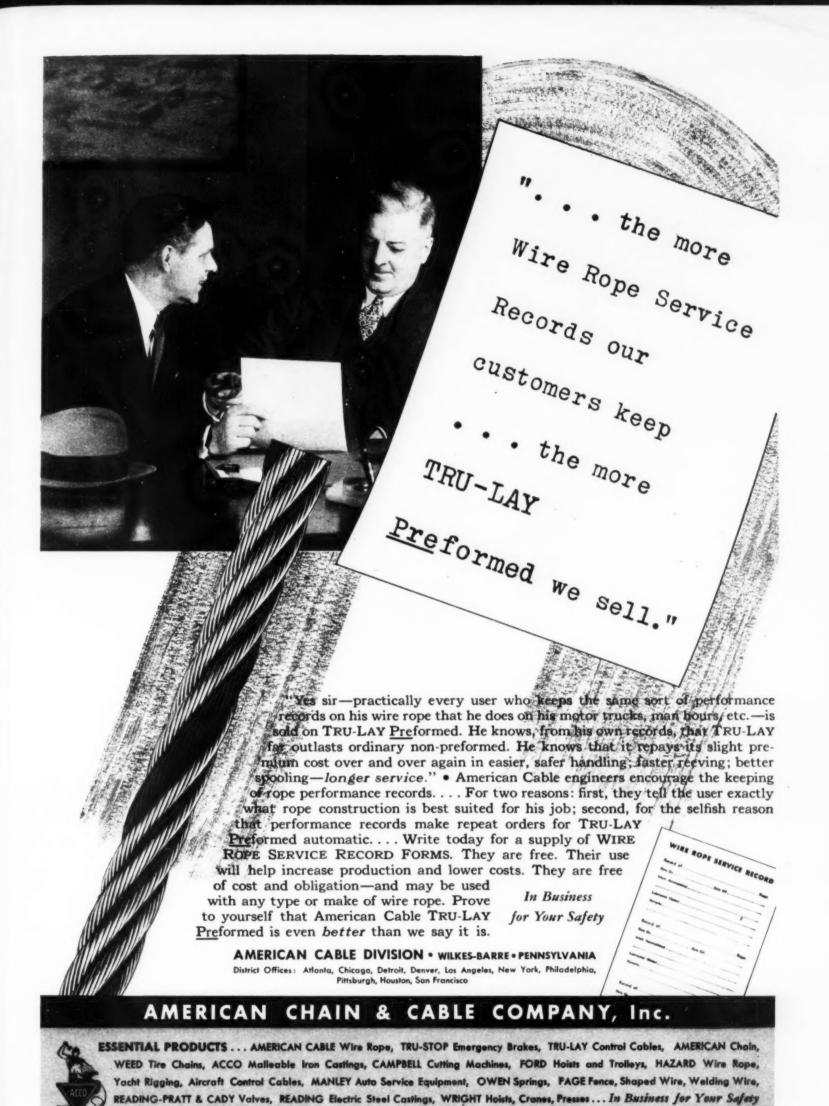
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